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Our article reprint policy is on [page 112](#)

Issues appear bi-monthly, on odd-numbered months, for area Amateur Radio operators and beyond, to enhance the exchange of information and to promote ham radio activity.

During non-publication months we encourage you to visit the Digital Communicator at ve7sar.blogspot.ca, which includes recent news, past issues of *The Communicator*, our history, photos, videos and other information.

To subscribe, unsubscribe or change your address for e-mail delivery of this electronic magazine, notify [communicator @ ve7sar.net](mailto:communicator@ve7sar.net)

If you find *The Communicator* worthwhile, regular readers who are not SARC members are invited to contribute a \$5 annual [donation](#) towards our Field Day fund via [PayPal](#).

SARC maintains a website at www.ve7sar.net

DEPARTMENTS

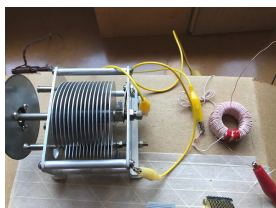
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IN THIS ISSUE



Radio Ramblings—All about CW, its history, and how to learn it properly

TinySA, an inexpensive spectrum analyzer



Crystal radio DX-ing

...and so much more!



QRM

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...from the Editor's Shack

Do you have a photo or bit of Ham news to share? An Interesting link?

Something to sell or something you are looking for?

eMail it to [communicator at ve7sar.net](mailto:communicator@ve7sar.net) for inclusion in this publication.

Where did 2021 go? Despite all the inconveniences of COVID restrictions, the year passed by very quickly, and was another great year for Surrey Amateur Radio. The training station space we share with the Surrey Emergency Program Amateur Radio (SEPAR) has been all but completed, with some tweaking of antennas and some interference abatement left to finish. Our thanks to the Surrey Fire Service for their support throughout this process.

You have heard mention of the Operations & Training Centre (OTC) on these pages many times in the past. It is a shared location with South Fraser Search and Rescue (SFSAR) and provides us secure space not only for a state-of-the-art radio room but also classroom space, washrooms and a kitchen.



This Month's Cover...

Another great issue for you thanks to our contributors. This time there is an abundance of CW related material, given that we were going to start our Morse code class on January 10th. Omicron has forced us to postpone but, enjoy regardless.

This space is regularly used on Saturday mornings (current COVID restrictions permitting), for exams, antenna building workshops, and general Elmering for amateur radio issues brought to us by our members.

You can follow the progress of this facility each issue in our 'OTC Report'; this time it is on page 100.

The last issue brought a wave of responses, all favorable, along with many requests to be placed on our subscription list. If you would like to receive every issue, just drop an email to communicator@ve7sar.net with 'subscribe' in the subject field.

From Surrey, BC Canada, all our best wishes for a very happy and prosperous new year.

73,

~ John VE7TI, Editor
communicator@ve7sar.net

On the Web

ve7sar.net

Between Communicators, watch your e-mail for news, announcements of Amateur Radio events, monthly meetings and training opportunities.

Click the links below to follow our presence on the web and social media:

SARC Blog

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Our YouTube Channel

[SurreyARC](https://www.youtube.com/SurreyARC)

SARC Photo Albums

Web Albums

or

tinyurl.com/SARCphoto

"If your dreams don't scare you, they are too small" - Richard Branson



The Rest Of The Story...

Triode vacuum tube developer

Hanso Schotanus à Steringa Idzerda (26 September 1885 - 2 November 1944) was a Dutch scientist, entrepreneur and pioneer in radio technology.

Summary

Between 1907 and 1917 he worked to introduce the already invented triode into radio technology. In 1919 Idzerda invented the triode IDZ-lamp, which was capable of transmitting and receiving radio messages containing the human voice. On 6 November 1919 he held the first public airing of a radio program. His program consisted of music, and him talking for a bit in between pieces. The PCGG transmitter he personally invented was capable of transmitting signals from The Hague all the way to England. Herman de Man, later to be an important author and radio maker, was present. From then on the program aired every week. In 1922 the Daily Mail decided to sponsor Idzerda, who previously financed the operation with his own money and some donations. After the Daily Mail ceased its support Idzerda's company went bankrupt.

On 2 November 1944, a V-2 rocket that was being testing close to his house crashed and Idzerda decided to take a look. He was ordered to leave the area but later snuck back to the rocket and was promptly executed.

Idzerda was born in Weidum, Friesland as the son of Henrikus Idzerda, rural doctor, and Wilhelmina Frederika van de Wetering. His first names were officially Hans Henrikus Schotanus à Steringa and were a variant of the first names of his grandfather Hanso Henrikus Schotanus a Steringa Idzerda (1831-1893), who was a physician, surgeon and midwife. Although coming from a family of doctors, he decided to study engineering at the Rheinisches Technikum in Bingen am Rhein, Germany, graduating in 1913 as an electrical engineer. He then settled on the Dutch coast in Scheveningen as an independent consultant "for the application of electricity in every area". He probably first registered at his branch in The Hague in June 1913 under the first names Hanso Henrikus and the surname Schotanus à Steringa Idzerda. The first names Schotanus à Steringa were therefore included in the surname.

Development of the triode

Idzerda focused on the development of wireless transmitting and receiving equipment. In his own company, under the name Technical Bureau of Wireless, he started manufacturing equipment, which he supplied to the Dutch army, among others. During the First World War, he experimented from the rectory of his in-laws, the Nicolaï family, in the town of

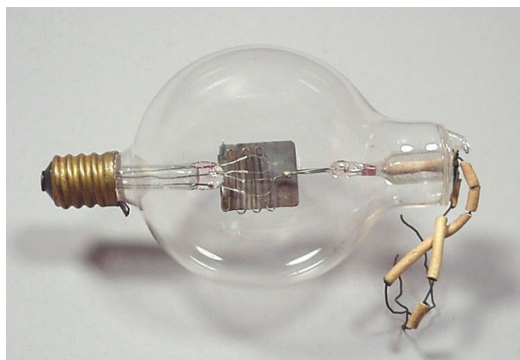


Hanso Idzerda

Mantgum. He was able to determine the location of radio transmitters, including German zeppelins sailing to England, using radio finders he had built himself. The Dutch armed forces made grateful use of his information.

He quickly realized the importance of sending messages quickly and easily over great distances. The technique used in those early years was radiotelegraphy. In the meantime, Idzerda was also experimenting with something new: radiotelephony, the wireless transmission of spoken word and music. This is where his real ambitions lay. He saw great possibilities for the new technology and wanted to replace the coded Morse messages with speech and cheerful tunes.

To do this he focused on, and succeeded in developing an improved triode vacuum tube that had already been invented in America in 1906 by Lee De Forest. The Eindhoven light bulb factory of Philips placed the tube into production in 1918 under the name PH-IDZ (Philips Idee-zet). Initially, the tube had a limitation - it was only suitable for receiving Morse code. To achieve the ability to transmit audio, higher power transmitting triode tubes were required. Together with Philips, Idzerda developed several improved samples.



In the early years of the 20th century, the aether is off limits to private individuals. Only military and maritime communication via crackling Morse code is allowed. Yet radio amateurs are already busy exploring the airwaves. With primitive home-built receivers they listen to the messages broadcast in Morse telegraphy. An illegal activity, but there is little or no control. The ban on listening is lifted in 1917, but broadcasting remains prohibited without a license.

In those early years, radio was inaccessible to most people. It is a hobby for handy amateurs, who with technical knowledge are able to build a receiver themselves. But, until the advent of the radio vacuum tube, amateur receivers consisted of a coil wound on a cardboard tube with two sliding coils and a crystal detector. You could listen to messages broadcast in Morse code from spark transmitters. Amplification was not possible in the receiver. All energy supplied to the headphones had to be supplied by the antenna. The receiving antenna was therefore several tens of meters long, and set up as high as possible.

After the introduction of the triode, radio amateurs moved en masse to the vacuum tube receiver. Aided by the radio DIY booklets of the technically skilled journalist Jan Corver, also a radio enthusiast and a contemporary of Idzerda, they put together their own 'one-tube receiver'. This receiver is many times more sensitive than the crystal receiver and is able to pick up signals from the aether over a greater distance. In addition, the antenna is a lot shorter. But who buys radio equipment if you can only listen to

”

*...it was only suitable
for receiving Morse
code*



Radio pioneer Jan Corver's first booklet from 1916 'The Wireless Receiver Station for the radio amateur'

The radio receiver, marketed to the general public.



Morse code? Very few of course. Listeners are still waiting for interesting content.

During an electronics fair in Utrecht on February 24, 1919, Idzerda introduced the Dutch public to the new technology of radiotelephony for the first time. He demonstrated his transmitter with his company NRI and in collaboration with Philips. He managed to broadcast spoken word and music completely wirelessly over a distance of 1200 meters. The very first sound on the radio in the Netherlands comes from a small wooden music box that Idzerda brought from home. This is followed by the voice of a lady in front of a carbon microphone. Many listen with admiration, and some are suspicious that a wire is hidden somewhere. The excitement among the audience was great - especially when the Dutch queen, Wilhelmina came to listen.

On the heels of this success, an effective (longwave) transmitter was built, constructed by Idzerda, with a triode transmitting tube built by himself and Philips, which is larger and has more power than the smaller receiving tube, and his own devised modulation system. Thanks to Corver, listeners now have the technical knowledge to (re)build their receivers. The time has come for public radio broadcasts. The technology is ready, there is a transmitter and there are listeners.

Idzerda wants to make radio a medium for the masses. As an inventor and builder of individual radio parts and complete radio sets, he also sees a market for his products.

After all, the studio and broadcast equipment was made by his own company, the NRI (Nederlandsche Radio-Industrie). Thus, seeing an opportunity to use his technology to start radio transmissions for the public, he decides to build a station himself, to apply for a broadcasting license, and to start making public radio transmissions.

On the air!

At the end of 1919, Idzerda is the first worldwide to provide a pre-announced, scheduled wireless radio broadcast, a musical program with march music and song. He does the presentation himself. With a broadcasting license in his pocket, he places an advertisement in the evening newspaper the Nieuwe Rotterdamsche Courant the day before to draw attention to his 'Soiree Musicale'. On Thursday evening, November 6, 1919, the time has come. With the radiotelephony transmitter designed and built by himself, and which has been issued the letters PCGG on the broadcasting licence, the first radio program goes on air from a makeshift studio at his home in The Hague between eight and eleven o'clock in the evening.

The listening audience consists primarily of radio amateurs with their self-built receivers. The broadcast started with the well-known Grenadier March: "Turf in your backpack". and "A girl that one never forgets". Classical music programs were played live by strings or chamber orchestras, and the first jazz was broadcast in January 1924. Idzerda's channel PCGG became wildly popular, which enabled him to request and receive the necessary financial support for his channel.

In addition, Idzerda built the tube transmitter "Fort Vossegat", which the KNMI used from 1924 to broadcast weather reports.

Radio broadcasts were performed with regularity in the programmed live transmissions. Unfortunately, none of these radio recordings have survived. Until September 11, 1924, Idzerda provided hundreds of broadcasts, which were listened to beyond the national borders. It broadcast on alternating 1050 and 1070 meters on medium wave.

Despite the low transmitting power of PCCG, the range of the transmitter is large. Idzerda's radio broadcasts can be received throughout the Netherlands and even in the south-east of England. Subsidized by the daily newspaper 'Daily Mail', Idzerda also provides English-language broadcasts starting on July 27, 1922. The 'Dutch Concerts' are highly appreciated. The sponsorship money from the English newspaper comes in handy for Idzerda because he can keep his channel up and running financially but with difficulty.

Making radio is an expensive activity. All radio parts are homemade and expensive experiments are preceded by them. The broadcasting license also costs money. The year before that, the Dutch regulator stopped issuing broadcasting licenses for free. The demand is too big. From then on you have to pay to be able to make broadcasts. Idzerda pays a lot out of his own pocket, receives sponsorship money from Philips and appeals to the generosity of his listeners under the motto: 'Show your good will, otherwise the aether will become silent'.



Yet after five years of making radio, the curtain falls. Sponsor Philips breaks off cooperation with the 'difficult' Idzerda in 1923 and joins the broadcasting activities of the Nederlandsche Seismaterialen Fabriek (NSF) in Hilversum. Idzerda finds himself in financial distress. He loses his broadcasting license and his company NRI eventually goes bankrupt in 1924. Philips, sees value in Idzerda's ideas and takes over his public broadcasting task. The following year, Philips donated two high transmission towers to the NSF, making reception possible throughout the Netherlands. The start of a national broadcasting station in Hilversum is a fact. The Hague and Idzerda no longer play a role.

In 1926 Idzerda received a broadcasting license again, but only for technical tests, not for broadcasting programs. With his new company, NV Idzerda Radio, he continued to make radio. In 1930, after the closing of the Hilversum transmitter at midnight, he provides his own program, the "Congratulation Service", but after 1930 his broadcasting license is no longer extended. Disappointed, he resolutely ended all radio activities in 1935. He sold his equipment and what was left he donated to the Dutch Postal Museum.

“
...the
radiotelephony
transmitter
designed and built
by him, which is
given the letters
PCCG on the
broadcasting
licence.

Patent battle with Philips

In 1930 he became involved in a patent battle with Philips. It was determined that the patent application for Idzerda's invention did not infringe the Philips patents, and in March 1931 Philips was unsuccessful with its suit. The patent was granted in January 1935 under number 50298, but expired shortly thereafter in September of the same year due to 'non-payment of the annual excise duty'.

His uncle Arnold owned four buildings in Scheveningen and therein ran "Hotel Mr. Idzerda", profiting from his famous nephew's reputation. Upon his uncle's passing in 1934, Idzerda continued this business under the same name and went to live in one of the buildings. He himself fell into oblivion afterwards.

Because of its strategic location on the North Sea, his hotel came to be located in the Sperrgebiet (prohibited area) during the Second World War, in May 1943. Because the Führer der Schnellboote (Commander of Speedboats) established himself with his staff close by, accommodations for the German soldiers were needed, which were sufficiently available in the deserted area. German officers were also housed in Hotel Idzerda, which gave Idzerda an income. He received passes to be allowed to enter the area.

His scientific curiosity made him go to the area on the evening on November 2, 1944 to look at a V2 rocket launched nearby, which had crashed causing extensive damage from the explosion. The projectile had left a huge crater. He went in search of its remains, but was caught by a German army patrol who sent him away. However, Idzerda returned on the morning of November 3rd and was picked up by the same patrol. This time he had parts of the warhead (believed to be the electronic component) in his possession.

He was thought to be a spy, arrested and brought to the Clingendael Estate for a short interrogation. On the adjacent Oosterbeek Estate, he was summarily executed under a beech tree and provisionally buried.

His remains were found there after the war, on September 28, 1945. Artist Don Vermeire, who acted as supervisor on the estate and also worked in a studio there, performed further excavation. One of the towns people recognized the silver tie clip Idzerda always wore, an owl with glass blue eyes, symbolizing wisdom. After further identification, his remains were initially buried in the War Victims Cemetery in Wassenaar, but his family was not informed until March 1946, after which he was reburied at Nieuw Eykenduynen. The fact that flowers from the resistance had been placed on the grave could indicate that he had been involved in resistance work during the war.

On November 6, 2019 it was exactly 100 years ago that Idzerda provided the first radio broadcast. On the occasion of the centenary, Dutch station VPRO broadcast a four-part dramatized podcast story "Hotel Idzerda", which was based on the stories recorded in September 1944 at the hotel. Narrated by Idzerda himself, they had been recorded on four 78 rpm records. In one of the original fragments of the recordings played, Idzerda says about the V2s flying over his house: "I would like to know how they managed that". It likely cost him his life.

And that is the rest of his story.

*~ Portions of this article courtesy of the
Netherlands Institute of Sight and Sound*

Other references:

<https://youtu.be/ci4TSbTCBhw>

[PE4BAS Amateur Radio Weblog: 100 years of
Dutch \(broadcast\) radio](#)



A follow-up question about EME

Kevin McQuiggin VE7ZD/KN7Q

In the last Communicator ([November-December 2021](#)), Kevin wrote about EME and the tracker/software he and another ham are developing.

Our reader ‘Randy’ complimented The Communicator and compared it very favorably to commercial amateur radio publications.

Thanks for the compliment! As an associate editor it is really nice to hear that people like the “magazine”.

Randy: “I just built a ECM interface into my Tailtwister rotor so I’m familiar with them. I plan to use linear actuators to move my dish. They were designed to run on 24 volts but if I drop the voltage down I should be able to achieve some good resolution. Already have 2-3 gathering dust in the shed. Now when my wife asks me what I’m saving those for I will have an answer! But I think my linear actuators use a Hall Effect sensor instead of a pot like a rotor. Will have to see if ECM has any way to use pulses instead of resistance for position?”

Not sure, but the new controller that my friend and I are designing will definitely be able to do this. We have achieved 0.001 degree resolution on the test bench. We figure that we may be able to use our EME dishes for radio astronomy or tracking space probes. If you haven’t heard of the “Amateur DSN” group then give it a Google search. Bunch of hams who receive telemetry from space probes, e.g. Mars Orbiter, directly.

Randy: “One web page I looked at made it sound like WJST had Moon tracking software included. But when I couldn’t find any information on how it interfaces to a controller, I concluded that WJST must just display the current Moon position on the monitor.”

If you bring up the “Astronomical Data” window in WSJT-X it has all the info you’ll need for EME and finding Doppler shifts, although the program does all the calculations for you and applies them automatically to the rig via CAT control. You’re right in that it doesn’t predict moon passes though.

Randy: “I looked at the sub-lunar page but didn’t see any prices on his slew drives... looks expensive though.”

The big dual axis slew drive is \$1500.

Randy: “Is your RPi code an image or an executable file?”

It’s a C program.

Randy: “My only radio in the shack is a Flex 6300. I did buy a Q5 Signal 2 meter transverter to use with it. The 6300 doesn’t have the ability for an external time base so to use as an IF radio, not sure how it would work with a 23cm transverter that Q5 also sells?”

That transverter only runs 25 watts so I’ll need a 23cm amplifier too. The equipment list just keeps building!

Another issue I have is my shack is going to be about 150’ away from my proposed dish location. It would be much closer to my shack to put it in the front yard but even I don’t like the looks of that. So my biggest hurdle will be designing a station to keep feedline losses to a minimum. I seriously doubt the Q5 23cm transverter would have the temperature stability to locate it at the dish and just run the 28 MHz IF cable over the 150’. Also wondered about putting a linear amp at the dish too. What would you do or what have you seen others do with a 150’ distance to the dish?”

Transverter and PA at the dish would likely be the way to go, although it introduces power and shelter (from snow/rain) problems. Lots of guys have setups like this though. At 150’ there would be significant loss at 23cm even with big hardline. My friend Dennis and I are working on an SDR based solution which would require only Ethernet cable to the antenna with the analog signals being generated out by the antenna, but it is in the very early stages. The signal cable will carry TX/RX switching, antenna pointing packets as well. It’ll probably take a year to have anything presentable going for us though. In the meantime we are going with old-style analog to/from the shack.

For finding other ops to talk to about options I would go to the HB9Q chat group. It is primarily for making skeds but there are conversations about questions and problems on there too.

Randy: “Yes I will certainly start with just a receive station with transmit not far behind. I’ve been using FT8 on HF and MSK144 for 6 meter meteor shower contacts so the WSJT program is not unknown to me.”

Sorry to dump a bunch of questions on you. Are there any active support groups I can lurk in trying to pick up information?”

NO PROBLEM! If I can help with any aspect I will. I am still a newbie myself so I will learn from hearing the answers to questions you have of others too.

I’m also on MSK144 (and FT8) on 6m, just completed WAS last summer. MS is a really fun mode. The place to be for MS on 6m and up is the “Slack” group called VHF-Chat. It has about 1000 members, of which probably 50-75 are really active and on the channels all the time.

The link to join is https://join.slack.com/t/vhf-chat/shared_invite/zt-a8qh72u9-PVYUdMiSyuswPGAtlti9w.

Keep me posted and any more questions welcome. 73,

~ Kevin VE7ZD/KN7Q

From The WOBTV Repeater

Jim Andrews KH6HTV

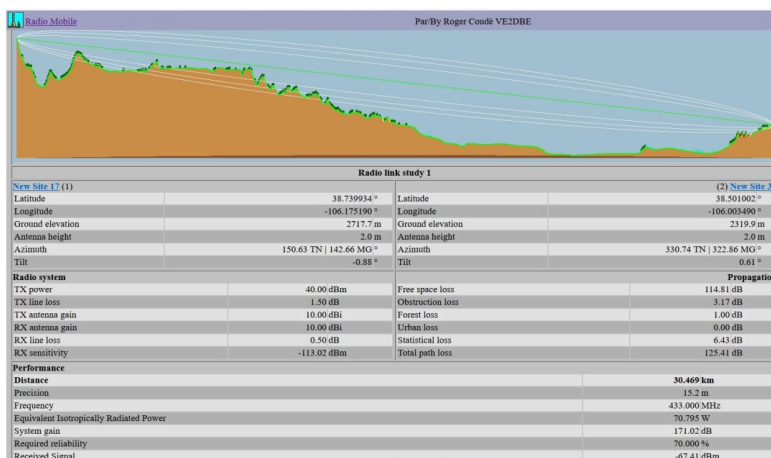
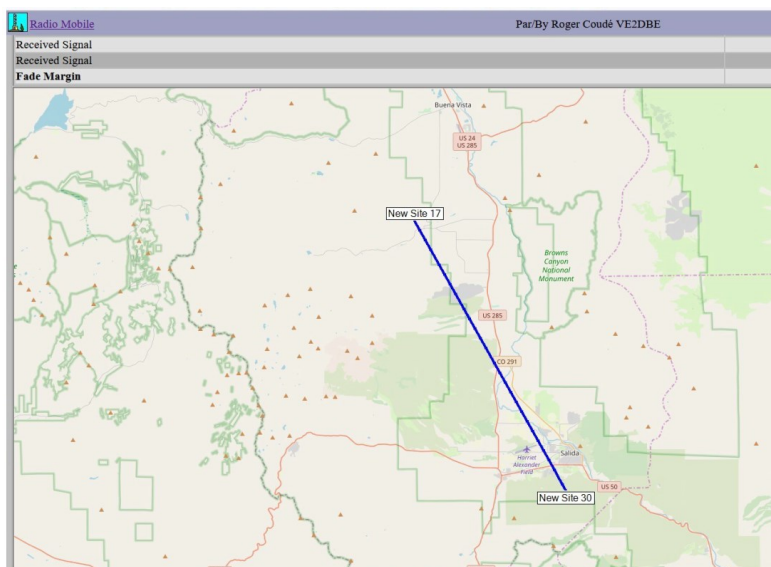
A UHF propagation question

The Question: Can an inversion layer, located at an elevation midway between stations at higher and lower elevations, significantly block UHF signals between them?

Background: Leon Golden, NØVWX, and Rick Peterson, WA6NUT planned an ATV DXpedition for the morning of November 10, 2021. The operation would be between two mountains in the Colorado Rockies. Leon set up his portable 70 cm. ATV equipment above Salida part way up Methodist Mountain. Rick's equipment was set up at a location on Mount Princeton. Leon was located about 400 ft. above Salida, at 7609 ft elevation, at the Rainbow Trail parking lot. Rick was located at 8914 ft. elevation, at Frontier Ranch, a youth camp. The weather was cold and blustery, with Leon reporting occasional snow squalls at his location. Leon's ATV transmitter was a Videolynx VM-70X, with about 3W output on 439.25 MHz (cable channel 60). Rick was also transmitting with a VM-70X, but also with a home brew amplifier with about 10W output. Both were using 8-element Quagi antennas.

Figure 1 [top right] is a map showing the 18.92 mile path between Frontier Ranch (transmitting) and Rainbow Trail (receiving).

Figure 2 [lower right] is the RF path profile and calculations using Radio Mobile Online software. The software estimates received signal levels and path losses.



The path profile shows a clear path. Note that the -67.41 dBm received signal level calculated by the software should give P3-P4 images at the Rainbow Trail location.

But no images were detected at either end. WA6NUT received only faint sync bars at the Mount Princeton location. Despite checks of the equipment and changing antenna headings, there were simply no TV images. Note that the 2 meter FM voice link was solid throughout their experiment, with only 1.5W transmitted from an HT at the Mount Princeton end. With similar setups, Leon and Rick had previously sent P4-P5 video over 5-mile and 10-mile paths.

After packing up and returning home, they tried to analyze the problem. Perhaps the Radio Mobile Online software was too optimistic in its estimation of received signal level. Perhaps the "Obstruction Loss" calculated by the software was too optimistic, failing to account for the grazing of the signal over the top of a ridge near the transmitting end. But the software has been used with great success by other amateurs, so they looked for another explanation.

Another Explanation? What if an inversion layer had been located at about 8300 ft. elevation (1100 ft. above Salida), at an elevation roughly midway between the

elevation at Mount Princeton (8914 ft.) and Rainbow Trail (7609 ft.)? Would Rick's signal from Mount Princeton bounce off the top of the layer and would Leon's signal from Rainbow Trail bounce off the bottom of the layer, so that neither Rick nor Leon would receive the other's signal? Or could the signals get trapped in a duct formed by the inversion layer? They'd like to pose these questions to readers of the WØBTV Repeater newsletter. Would anyone like to help them solve the mystery? Any comments would be greatly appreciated!

Reference: Tropospheric Propagation website by VK3FS (includes an excellent YouTube presentation)
<https://3fs.net.au/tropospheric-propagation/>

~ Rick, WA6NUT, Buena Vista, Colorado

*With thanks to Jim Andrews KH6HTV
Reprinted courtesy of the TV
Repeater's REPEATER Newsletter. Past
issues are available at:
<https://kh6htv.com/newsletter/>*

WATCH ATV FROM AROUND THE WORLD:

Check out the BATC web site:
<https://batc.org.uk/live/> There you can watch live streams from 62 ATV repeaters, plus several hundred ATV hams from around the world. There are some repeaters that are streaming 24/7, but it may not be a "live" program, but simply a test pattern.

But you can still catch some interesting live programs in progress. Our own Boulder ATV group streams our Thursday afternoon nets live via the BATC. Click on either KH6HTV-TV under repeaters, or N0YE under members.

Page 12—News You Can't Lose

73 Magazine

Ready for a bit of Ham nostalgia? Check out 73 Magazine archives, available on the Internet

<https://archive.org/details/73-magazine>



Page 13—News You Can Lose

The Lighter Side of Amateur Radio

New ham radio mode bypasses need to actually make contacts



From our correspondent—Building on the popularity of FT8, a new mode has been announced known as FTGreat or "FTG" for short. Why is it so great? Well, in the words of lead developer Chip Anderson K1QRP, "This new mode eliminates the tiresome need to actually make contacts in order to win awards like DXCC, WAS, and the prestigious Fred Fish 6m award."

He added, "We all know your station could make the contacts if you were there, so why should you be punished just because you have to mow the lawn?"

Once you install the software (a step the developers are hoping to eliminate), you simply enter your location and details about your station - power, frequencies, antennas (optional), etc... after which the software looks at conditions and decides which contacts should go in your log.

There is even the potential to use bands not currently allocated to amateur use, since no transmissions are necessary.

Psychologists are applauding the release of FTG as a stress reducer for anxious hams and a boost to marital harmony. A prominent marriage counsellor for ham operators has seen a dramatic drop in business because "...now you can watch a romantic movie with your wife without pretending to use the bathroom to work a rare DX station. It's a win-win!"

- Adrian VE7NZ (an avid FT8 user), reporting from the living room while earning DXCC on 10m and watching *Love Actually*, again.



Q: What do you call an apology written in dots and dashes?

A: Re-Morse Code

Ham Leftovers...

GBARC Canadian Club Map

The **Georgian Bay Amateur Radio Club** is pleased to announce our map display of all Radio Clubs in Canada. New to the hobby and looking for a club in your area, lost touch with other clubs due to the pandemic, this may be for you. Add your Canadian club to our map.

<https://gbarc.ca/clubs.php>

Looking for a mic?

Are you upgrading your ham microphone or headset? North Shore Amateur Radio Club members, Adam Farson VA7OJ, and John White VA7JW, have done extensive testing of some popular microphones. Their results are published in the following link: https://www.ab4oj.com/icom/ic7700/mic_eval.pdf

Getting started with FT8

In this video Hayden VK7HH shows you how to get started with the popular digital mode FT8. FT8 is a mode in the WSJT-X software developed by Dr Joe Taylor K1JT. This video shows how to get started and make contacts with FT8, introduction for new beginners and even a pro tip on how you would know, from a quick glance, if the bands are open. Get Started with FT8 - An Introduction for Beginners: <https://youtu.be/YyWX0i87P0o>

Download WSJT-X: <https://physics.princeton.edu/pulsar/k1jt/wsjt.html> and an FT8 Operating Guide https://www.physics.princeton.edu/pulsar/K1JT/FT8_Operating_Tips.pdf

Galway Radio newsletter

They apparently don't publish many, but here is the Galway Radio Club Journal, a newsletter almost as interesting and nice as ours 😊 Lots of DMR stuff too.

<https://www.galwayradio.com/wp-content/uploads/2020/11/GRC-Newsletter-Winter-2020.pdf>

Finding RFI with an AM radio

RFI is common place. Here is a neat little trick to hunt down sources of interference in and around your home: <https://youtu.be/p8i8HmxeHnM>



Emergency Comms

Amateur Radio Making A Difference

4. Understanding communications failures

Tom Cox VE6TOX



Amateur radio likes to point out that “Communications fails during disasters”. That may be correct, but it also demonstrates only a basic understanding of communications failures.

To say “Communications Failed” during a disaster is a perfect example of a communications failure. It says nothing of what failed, how it failed, when it failed, or why it failed. It is the exact equivalent of saying “Something went wrong!” Really, you figured that out by yourself?

For all the thousands of After-Action Reviews and Post-Incident Assessments stating that communications failed, very few of them can identify exactly why we continue to have communications failures. Despite billions being spent on interoperability ¹, communications are still failing.

This is where amateur radio needs to step up to the plate; if you want to help with emergency communications, we need to be experts in understanding communications failures.

You can’t truly help if you don’t have a full understanding of where you can help the most.

Let’s understand the nature of communications failures, the four major categories of why communications fail, give you a quick shortcut to narrow focus to exactly where the communications failed, and provide an understanding of why it will continue to fail. We’ll also take a quick look at how ICS mitigates some of the failures.

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He has taught over 400 ICS instructors in Canada, conducts professional development workshops across North America and has written extensively on ICS and ICS instruction.

He received his first ICS training as a volunteer with the City of Vancouver and the Vancouver Emergency Community Telecommunications Organization (VECTOR).

¹As observed for the Los Angeles Airport shooting: “...first responders could still not effectively communicate on the day of the shooting, despite the investment of \$13 billion since 9/11 towards achieving interoperable communications capabilities.” That’s expensive when it doesn’t fix the problem. Quote is from “TSA LAX Shooting After-Action Report Identifies New Safety, Security Measures”, Homeland Security Today Staff. 03/27/2014

Understanding Communications Failures

- It is not a disaster characteristic. They happen all the time. They happen so often that multiple failures may occur within a few minutes and we don't even notice. Humans are exceptionally good at accepting and overcoming communications failures that we don't even notice them. Have you ever missed a phone call? Have you ever had someone flash their high beams on the highway and you didn't know why? Those are communications failures, but we neither remember them or experience horrendous outcomes. It is only during a disaster that we see the impacts.
- You cannot fix all communications failures. Only some of them. You do not have the resources, ability, or time to fix all the failures that will occur during a disaster. You need to understand (and then focus on), where it fails the most, where you can help the most, and why you can't be everything to all people.
- If communications failures are one of the first characteristics of a disaster, fixing communications failures will be one of the first response actions. As a result, amateur radio may only be needed for an extremely short period of time, but the need will be overwhelming.
- Amateur Radio is a scarce resource. You must understand that when communication fails, you will only be able to mitigate a fraction of the communication links. You need to understand where you will be needed the most. That is one of the most critical parts of emergency communications.

The Four Categories

There are 60 distinct types of communications failures². Each is distinct from all others, each has a unique underlying cause and each may require a unique solution, although some solutions may solve multiple failures at the same time. While we do not have time to go into the specifics of each of the distinct types of failures, all failures fall within four categories which broadly summarize the groupings within the comprehensive list.

Communications must be defined first, as there are a number of definitions of communications that are less appropriate than others. For example, communicating rooms are adjoining rooms that open to one another and a communications failure would be blocking the door. We are not talking about the communications of synapses, or personal rapport between people and generations.

We are talking about the passing of information from one location to another. Even this will have nuance. First, we are talking about one-way communications as much as two-way communications. A public warning, such as a tornado siren, doesn't require two-way communications. Secondly, an extremely wide variety of modes are included. If you don't know American Sign Language, a warning to the deaf community will need another mode. Flashing headlights, sirens, amateur radio, apps, winks, whistles, and "a knowing glance" and crossed fingers are all modes used during emergencies. Even verbal communications will sometimes work, if you can believe it!

²This is based on the paper "Understanding Communications Failures" for Comm Academy in Washington State, the Colorado Emergency Management Association, and the South Dakota Emergency Management Association. In the paper, it is noted that no complete or definitive list of communications failures exists to my knowledge, and a comprehensive list of sixty distinct types of failure is provided as a basis for creating a definitive list.

All communications failures fall into four categories:

- **Mode failures** - this is where the mode itself has been damaged or destroyed or is no longer working, or the mode is impaired or cannot work. While often seen as damage to the mode, power failures take some communications modes out of service. Using verbal communications in front of the amps at a rock concert would be a mode failure and the mode is working fine - but not for that environment.
- **Information failures** - this is where the information was incorrect or incomplete. While information is usually correct or incorrect, there are a few subtleties to this category that catch us by surprise. Rumours, lack of context, and translation errors would fall into this category.
- **Human failures** - the largest category of failures and the toughest to fix. Human failures include “what you said is not what I heard”, “in one ear and out the other”, and failure to follow through when a message is sent.
- **Time failures** - rarely seen because most communications are almost instantaneous but examples exist. It takes 21 hours to send or receive a signal to/from the Voyager 1 spacecraft. The warning of an iceberg from the crow’s nest to the bridge of the Titanic arrived after the point where the Titanic could have turned to avoid the iceberg. The mode worked, the information was correct, both the sender and receiver acted immediately, but the message had to be sent before the iceberg was seen in order to turn the ship in time.

Four Questions to Ask

Understanding the four categories of failures provides a series of questions that can be used to identify where any communication

failure lies. This is a quick and effective tool to prevent one type of failure being mistaken for another. The series starts by leaving the least likely type of failure to the last - the time failures - as they are almost never the cause when communications is almost instantaneous.

1. If the information was correct and the people handled the information correctly (both sending/receiving), then the failure must be a mode failure.
2. If the mode worked and the people handled the information correctly (both sending/receiving), then the failure must be an information failure.
3. If the information was correct and the mode worked, then it must be a human failure.
4. If the mode worked, the information was correct, and people handled or would have handled the information correctly if there was time, then it must be a rare time failure. The lookout on the Titanic warning of the iceberg ahead is an example; the ship needed the warning before the iceberg could be seen in order to make the turn in time.
5. I use this when reading after-action reviews, post-incident assessments, lessons learned, and public warning failure reports all the time, to the point using the first three questions becomes second-nature.

Implications of the List

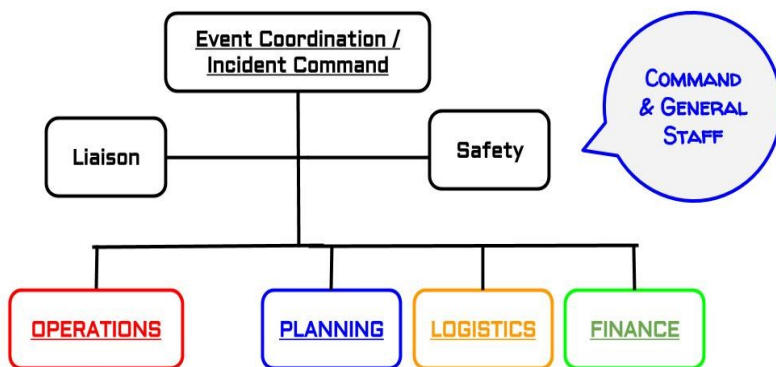
Presenting the paper “Understanding Communications Failures” often presents a unique communication failure example. People like the message - to the point where they deliberately ignore the conclusions presented. When it comes to communications failures, there are no happy answers.



Because communications are required for virtually all interactions, the Incident Command System has built a system of solutions in.

Several observations come out of the list, and none of them will prevent communications failures from occurring on a regular basis:

1. Every mode in the world is designed to fail. This is because no communications mode is ever designed to have everyone on it at the same time. It would cost too much and would rarely be used. As a result, communications modes are designed for regular peak loads rather than the maximum usage needed during an emergency or disaster. Working modes will always fail when usage exceeds mode capacity.
2. No government in the world can afford to buy the latest technology. Taxpayers won't fund it. Therefore, the \$7000-\$15000 interoperable radios are slowly purchased and are already out of date as new video-capable radios come on-line. The pandemic experienced multiple communications failures as organizations were still using fax machines.
3. Every solution to a communications failure automatically and invariably creates another communications failure. Having too many people on one frequency can be solved by using multiple frequencies. But then you have created a communications error of not hearing what occurred on the other frequency. Keeping everyone on a single frequency but keeping messages short causes communications failures when messages no longer have all the required information or the context has been removed. Every solution always creates another failure.
4. The majority of failures are human failures. We may have two ears, but we only have one brain to process the information. We can't listen to two conversations at the same time, we get tunnel vision, we forget, and we misunderstand. We claim we can multi-task, but then prove we can't every time we try to use a smart phone while driving. So, do we replace the people?
5. Technology fails. From ice sensors on jets causing the aircraft to crash, to spiders disrupting air quality monitoring stations, technology can fail. How many times does auto-correct on your phone change your text message into incomprehensible, hilarious, or dangerous alternative messages? If you trust auto-correct all the time, just hit "send" and enjoy what happens next!
6. New technology introduces new failures. Every time new technology is introduced, it creates a new set of communications failures. This may be from



ICS uses a standard system of naming sections and the positions within those sections.

insufficient of beta-testing, lack of coverage, or backward-connectivity failures. Often, new technology is designed to replace the old mode rather than interact. As well, proprietary systems, like Apple's operating system are deliberately designed NOT to interact in order to force more people into the company's eco-system.

7. From the design of equipment, the creation of messages, to the design of antennas and choices of capacity and capability, human decisions impact every aspect of communications with the exception of time. We still haven't found a way to create time or go back in time. When we do, we will probably find ways to get that wrong as well! All communications failures except time failures are ultimately human failures.

How ICS Mitigates Communications Failures

In an emergency, every possible type of communications failure may occur. Because communications are required for virtually all interactions, the Incident Command System has built a system of solutions right in. This does not guarantee communications won't fail, but it reduces the number and impacts of communications failures as best we can. Many instructors, let alone users, of ICS are not aware of the multitude of communications processes built into the system.

These include:

1. **Forms** - documenting actions, directions, messages, and contexts. From the 201 Briefing form to the 204 assignment list, to the 215/215a planning worksheets,
- every form has a specific place in order to reduce communications errors throughout the entire response.
2. **Common Terminology** - this is not simply having one meaning for a word or phrase. The use of Common Terminology provides a specific meaning, purpose, intention, context, placement, hierarchy and usage. A staging area is not where you hold a play with actors. It is a specific location, safe from the hazard, managed by a Staging Area Manager who only reports to the Operations Section Chief, where you can sign into the Incident on a 211, and where everything must have a status of "Available". You only have to say "Staging Area" and everything else comes with it - it is not implied. Every relationship is a requirement. Common Terminology reduces human failures by providing a specific meaning and required context to each word.
3. **Planning Cycle** - the Planning P is used to ensure specific information is communicated to the right people at the right time³. This specifically helps identify and mitigate some time failures.
4. **Briefings** - like the Planning P meetings, briefings are used to ensure specific information is communicated to the right people at the right time.
5. **Communications Unit in Logistics** - This unit programs radios, runs dispatch, sets the communications plans and places repeaters specifically to reduce mode failures.
6. **Information Officer** - This position creates, obtains authorization, and distributes and displays information to ensure it is correct and accessed.

³ The Arizona Division of Occupational Safety and Health documented the absence of key Command and General Staff during the Planning Meeting as a contributing factor in the death of the 19 Prescott firefighters on the Yarnell Hill Fire on June 30, 2013.



The focus on being a “media officer” rather than on the specific role of information officer means this position is often the cause of the greatest information failures on Incidents. The media is a mode to distribute the information, not the target audience requiring the information.

There is a myriad of additional mechanisms within Incident Command to reduce communications failures, from vests and vest colours to T-Cards and wall charts. The 4 Categories and 60 Types of Communications Failures cannot stop all gaps and errors. But they can bring awareness to the most likely and severe causes.

Experts in Communications Failures

If Amateur Radio wants to assist with emergency communications, then amateur radio needs to improve our knowledge of how and why communications fails and what we can do about it. We must get beyond “Communications Failed” and be knowledgeable about exactly what is failing and experts in what amateur radio can or cannot do when failures occur. Otherwise, we are contributing to the list of communications that failed during a disaster.

Next, we need to start applying ICS and amateur radio within actual incidents. Who are we working with? Who will direct us? Who needs the information? What information is needed? How can we help. By looking at the specifics of smaller incidents, we can better assist when we are really needed - on the bigger incidents.

Up next in this series:

5. Supporting emergencies

6. Supporting disasters

~ Tom VE6TOX

2022 Comprehensive list of communications failures

Tom Cox VE6TOX

This is not the “Definitive List”, but a work in progress to create a definitive list.

To say “Communications Failed” during a disaster is a perfect example of a communications failure. It says nothing of what failed, how it failed, when it failed, or why it failed. It is the exact equivalent of saying “Something went wrong!” Just as we use a Pantone Colours coding as a standard language to communicate a common understanding of what colour is being referred to, we need a standard list of types

communications failures to standardize exactly what type of comms failure we are discussing. If we don’t agree on what we are talking about, that would be a communications failure!¹

The four major categories (Mode, Information, Time, Human) create both a folder for holding specific types of communications failures, but also the means to identify what failed. The cryptic notes behind each type are specific examples from my experience or on the internet that I use to illustrate the failure.

¹ #45 or #47

Time failures

Mode worked, information correct, people acted appropriately, therefore there was not enough time to act on the information before impact.

1. Information arrived too late to act on (Voyager 1 space example, Titanic lookout). This may include time required to create the message (time caused), but would not include time to approve the message for release (human caused)

Mode failures

The information was correct, people acted appropriately, enough time, therefore it must have been the mode that failed.

2. Mode damaged or destroyed by incident
3. Mode impaired by incident - physical damage
4. Mode impaired by incident - operating environment i.e. Titanic steam noises during sinking or radios in tunnels/buildings, noisy environment
5. Mode damaged or destroyed by human action - i.e. dropping the radio (no intent)
6. Mode impaired but not by incident - i.e. amateur radio atmospherics, poor maintenance, "Give it a kick right here"
7. Mode garbles message - i.e. lousy speakers, poor quality text to voice generator
8. Mode power failure - power supply failure due to loss of power, including old batteries
9. Mode power failure - battery capacity inadequate
10. Mode cannot carry enough information - flashing headlights, tornado siren
11. Mode does not have adequate capacity for amount of traffic required (Australian Headlights, 9/11 radios, Slave Lake cell phone towers.

12. Mode does not have adequate capacity for the speed required (i.e. formal messaging)
13. Mode too fast for comprehension at receiving end
14. Mode only allows single user - VHF radios
15. Mode allows more than one user - too many people talking on a conference call
16. Mode does not reach the desired location - plans couldn't hear ops chief briefing
17. Mode does not reach the desired person
18. Mode does not reach the desired distance - VHF radio vs mobile radio, how far can you yell
19. Mode does not connect to another mode (amateur radio to phone, VHS to Beta, Ecomm desks
20. Mode mis-programmed - Vancouver 10 digit dialing robbery 911 call

Information failures

Mode worked, people acted appropriately, enough time, therefore it must have been the information that caused the failure.

21. Information incorrect - information wrong or exaggerated info being sensationalized on twitter
22. Information missing - context or missing required WWWWW&H, injury on a beach with no reference points. Context missing on PowerBars, truncated messaging,
23. Information became wrong - Kinglake warning, wind change for 050505
24. Correct but conflicting information - reception centre list for Slave Lake
25. Information correct but cannot be used - street address in Joplin tornado when all signs gone.

Human failures

Mode worked, information correct, enough time, therefore it was the people creating and sending the message or the people receiving and acting on the message that caused the failure.

26. Intentional and malicious failure - sabotage, hacking, war, frequency jamming²
27. Intentional and non-malicious failure - proprietary advantage, ignoring calls, phone off in theatre, closed door for plans, police encryption
28. Mode works but not turned on - wasn't aware of mode
29. Mode works and on but not used - amateur radio not using a working phone
30. Mode worked but volume turned down - cell phones in disaster meetings, phone in pocket
31. Mode worked but nobody was listening - Titanic SOS calls, VECTOR meeting - no-one monitoring the radio.
32. Mode worked but operator using in noisy environment - generators, no headset, failure to move to quiet area
33. Mode worked but operator listening to another frequency
34. Mode worked but operator failure - no training, skill fade, inadequate handbook
35. Mode worked but deliberately impaired - tornado siren volume down for shift workers
36. Mode worked but wrong mode selected - talking to a deaf person
37. Mode choice wrong/picked wrong mode - police cell phone use in London Bombing, used slow mode when faster mode available
38. Mode worked but operator not releasing PTT to open frequency
39. Mode worked but receiver unwilling to listen to message (anti-vaxxers)
40. Mode worked but receiver does not believe the source (twitter)
41. Mode works but not selected due to expense - AFRRCs radios at \$7K, satellite phone costs
42. Time - time to create message, time for approvals, time for perfection - conscious delay above the minimum time to create a message/warning.
43. Information correct but source not trusted - government and twitter
44. Information correct but not acted on - procrastination or overworked
45. Information correct but perception or analysis wrong - "I couldn't believe my eyes", not in centre of polygon for Tornado warning
46. Information correct but too much information - wordy people, overwhelmed duty officers, information overload
47. Information correct but misunderstood - two things with same name, Yarloop warning ignored, watch or warning, Slave Lake acronyms
48. Information correct but context misunderstood - water and PowerBars example
49. Information correct but mistranslated - didn't understand message, De Gaulle, hair brush fire
50. Information correct but not sought out - the hardest hit areas are the last responded to, IC for 9/11 tower collapse

² Intentional failures, both malicious and non-malicious, can be the cause of almost any communications failure on the list. Rather than have a human-intended duplicate for each type of failure, all intentionally caused failures are grouped under malicious intent (criminal, war, spying, censorship) or non-malicious intent (personal, organizational).

- 51. Information correct but priority wrong - priority wrong, not provided, not recognized CoE SOLE
- 52. Information correct but receiver overwhelmed - information overload, distraction, 2 radio problem with multi-tasking
- 53. Information correct but not sent - Fort McMurray raft drowning, Australia 2009 warning, typical site to EOC communications failure, Sundre tornado, embarrassment
- 54. Information correct but not analysed correctly - tunnel vision
- 55. Information correct but not captured - "if you don't write it down, it never happened" 4a.m message to self in morning is a scribble
- 56. Information correct and sent but not displayed
- 57. Information correct but over-sent - redundant information clogs system on one or multiple modes
- 58. Information over-sending - making your problem someone else's problem in disasters
- 59. Information sent to wrong party - details of police operation get to criminals/terrorists
- 60. Information correct but legal bar - cannot legally pass on (FOIP, next of kin, minors involved. The mode use prevents the mention; public can intercept the confidential information.

~ Tom Cox—January 1, 2022

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Reading Tom's series of articles, I was reminded of an experience back in August 2003. The US Navy hospital ship, the USNS Mercy visited Vancouver, and was part of an international emergency communications exercise that included members of the VECTOR amateur radio group from Vancouver. With a group of five amateurs, we were able to travel on board the Mercy from Seattle to Vancouver.



Not a luxury cruise by any means, but a great opportunity to set up our radio gear and to contact various other emergency communications organizations en-route as part of the exercise..

Left a photo of the USNS Mercy, a 1,000 bed hospital ship commissioned in 1986, and above John VE7TI and Tom VE7TOX (now VE6TOX) aboard, conducting radio tests.

~ Ed.

Venerable CW



Learning CW is also of interest to many new amateurs, so we will also look at how CW has been taught in the past, and how to prepare for a CW course if you have interest in “learning the code” and getting a CW qualification for your own use. With SARC’s CW course coming up in early 2022, this is timely!

In the early 1900s, before the capabilities of the vacuum tube were well understood, carrier signals were generated by “spark gap” generators: mechanical devices that generated crude carrier signals by using a motor to “make

and break” an electrical connection several thousand times per second. The sparks created a very rough carrier signal that could be used to communicate over distance. See Figure 1.

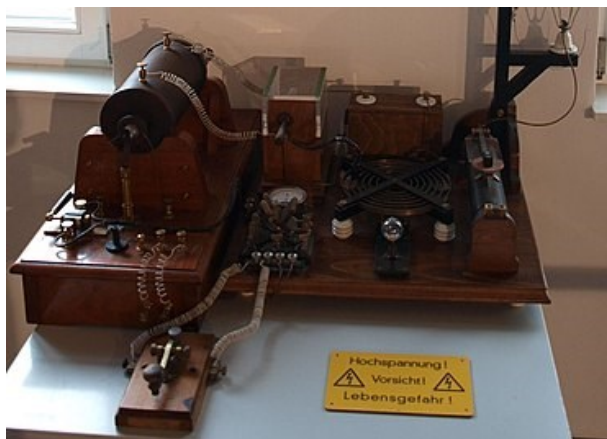


Figure 1 – Spark Gap Transmitter [17]

Early amateur radio operators used spark gap transmitters to generate their carrier signals and keyed these signals on and off using Morse code. The similarly crude receivers of the day would receive these spark gap signals and used simple detectors to recover the on-off keying. The operator could then decode the transmitted Morse code message by ear.

Spark gap transmitters had very poor frequency control and the quality of the transmitted signals was extremely poor, but amateurs (and the early commercial radio industry) just lived with it as no better technology was then available. Extreme QRM and low-quality signals were commonplace.

Vacuum tube technology was advancing rapidly, however, and by the early 1920s it was possible to generate carrier signals of much higher quality using vacuum tubes. These carrier oscillators were called “continuous wave” (or “CW”) oscillators and were thousands of times more accurate in frequency, amplitude, and phase. Vacuum tube oscillators generated very clean signals, so QRM was greatly reduced, and amateur stations could use frequencies closer together.

Every amateur aspired to building or acquiring a “CW” transmitter and improving the quality of his transmissions. Hams moved from spark gap to CW as fast as their finances would allow. The last spark gap transmitters were retired from service in 1929 under new regulations which were approved by the International Radiotelegraph Convention in 1927 [18].

Morse code communication was still the only mode available to most hams (other than a *tiny* number of operators experimenting with AM - amplitude modulation), so the term “CW” became synonymous with communication via Morse code.

This is where the term “CW” came from, and why it persists today.

A Short History of Telegraphic Codes

Telegraphic codes (and CW) use “dots and dashes” and the spacing between these symbols to represent a written alphabet. Modern CW is derived from landline (or telegraphic) codes that were developed in Germany in the 1840s and standardized at the International Telegraphy Congress in 1865 in Paris [1]. Modern CW uses this International Morse Code.

Variations of the international code exist for non-Latin character languages such as Cyrillic languages (e.g. Russian), and pictographic languages such as Japanese and Chinese [1].

CW in Amateur Radio

CW dominated amateur radio communications from the hobby’s inception in the early 1900s through the 1950s. Competence in CW was a requirement for licensing in all nations, and international compliance to this standard was stipulated in ITU (International Telecommunication Union) regulations.

With the introduction of voice modes such as AM in the 1920s, SSB in the 1940s, and FM in the 1950s, the use of CW as the most popular mode of communication in amateur radio



CW has played a big role in military, commercial and space programs, and even in broader society

declined, although proficiency was still required for licensing until the 1990s, when ITU regulations changed to only require CW proficiency for amateur radio operations below 30 MHz (i.e., in the HF spectrum).

This requirement was subsequently amended to eliminate the CW qualification requirement for HF operation entirely, as long as the licensee demonstrated a higher level of proficiency in fundamental radio technologies and regulations. This is why a higher pass mark of 80 percent on a Canadian “Basic Qualification” examination automatically grants the holder HF privileges.

By the 2010s, demonstrated CW proficiency as a component of licensing had been eliminated in Canada, the US, and in most other nations.

Use of the CW mode, however, remains *extremely* popular within international amateur radio ranks and thousands of operators utilize the mode every day. Many amateur operators in Canada seek their CW endorsement as either a way of gaining access to the HF bands - those bands below 30 MHz - or for the sheer enjoyment of using a “new language” to communicate with other hams. CW is fun!

Use of CW also gives many hams a connection to amateur radio’s roots. There is a resonance to the mode which gives operators a sense of being part of an activity with a long tradition of technological innovation and service to the community.

CW in Broader Society

CW has played a key role in military and commercial telecommunications services as well as in amateur radio over the past century. However, advances in telecommunication technology over the past several decades have de-emphasized the reliance on CW within the military and commercial services.

CW was phased out in most of these services decades ago in favour of newer, more capable digital technologies. Digital signal processing (DSP) and software-defined radios (SDRs) allow the creation of radio systems with far better sensitivity, selectivity, and performance. These more efficient communications systems are possible because of the advances in computing and digital technologies. We are seeing these amazing advances within the amateur radio service as well, with the adoption of SDR transceivers and DSP software such as WSJT-X.

Nonetheless, CW has played a big role in military, commercial and space programs, and even in broader society, over the past decades. It is worth looking at some of these applications in a bit of detail. Here are some examples:

a) Military and Commercial Communications

Up until the 1970s, CW was commonly used as a form of military and commercial communications services. CW requirements were in place for radio operators, technicians, pilots, and even astronauts. While voice modes such as AM or SSB were the

normal mode of communication from the 1950s onwards, CW served as a backup mode, and was relied upon under conditions of emergency, or during periods of poor propagation.

This knowledge of CW was put to good use by USA Naval Commander Jeremiah Denton when he was a prisoner of war during the Vietnam war for eight years beginning in 1965. Denton, the pilot of an A-6 Intruder attack aircraft, had been shot down by North Vietnamese troops while leading his squadron in an air attack on targets in the region.

Imprisoned in Hanoi and subjected to torture, in 1966 Commander Denton was forced to appear in a televised propaganda interview conducted by his North Vietnamese captors. See Figure 2 [above right]. He answered questions about his treatment and the living conditions of other prisoners in the interview, but blinked his eyes in Morse code, spelling the word "T-O-R-T-U-R-E" to let the world know that he had been mistreated and forced to do the interview.

A subset of the interview, which shows Commander Denton blinking in Morse code is at <https://www.youtube.com/watch?v=rufnWLVQcKg>.

Denton survived almost eight years in captivity and later became a United States Senator.



Figure 2 – Commander J. Denton in Forced Propaganda Interview

b) The Victory Nickel

As part of the British Commonwealth during the second World War (1939-1945), Canada made a significant contribution to the war effort in terms of personnel and equipment, but also in providing resources to allied nations. The whole nation rallied behind the war effort, and this included “V for Victory” propaganda programs which reached nearly every corner of Canadian life.

CW (or Morse code, in this case) played an interesting but little-known role in this effort. In 1943, the Royal Canadian Mint introduced a new “Victory Nickel”: the familiar 5-cent coin with a large “V” included on the reverse side of the coin [2]. The “V” replaced the traditional beaver. See Figure 3.

If you look closely at the inside edge of the coin in the photo, you will see a series of “dots” and “dashes” that run clockwise around the edge, just inside the 12-sided raised rim of the coin. The message spelt out a popular victory slogan, “We win when we work willingly”. See Figure 4 for a close-up of a section of the rim with a few characters decoded.



Figure 3 – Canadian Victory Nickel, and Figure 4 – Closeup of the Victory Nickel Rim Showing Dots and Dashes

“We win when
we work
willingly”





The 2020 Canadian two-dollar coin commemorates the victory in World War II. Like its five-cent predecessor, it also has a CW inscription. [19]

These nickels remain collectible; I had one when I was a kid, but (alas) have lost track of it over the intervening decades!

c) The Apollo Space Program

At the gnradio conference in Huntsville, Alabama in 2019 I saw an excellent presentation by NASA scientist Dr. Robert Suggs (NN4NT) entitled “How we talked from the Moon: the Apollo communication system” [3].

Although the Apollo spacecraft program ended in the early 1970s, the presentation was fascinating as it described the very advanced telecommunication system which was in place to relay voice, telemetry, and video data to and from the moon for the Apollo missions. An interesting NASA publication that fully describes what was called the “Apollo Unified S-Band System” is online for interested readers: see [4].

There were a number of hams at the conference, and we noted that the “Unified S-Band System” included an “Emergency Key” through which the astronauts could use CW to communicate with Earth using “a. manually keyed 512 Kc sub-carrier”, if all of the other more sophisticated communications systems failed. See Figure 5.

All astronauts up through the 1970s were required to have Morse code proficiency. It remains a highly recommended qualification for NASA astronauts today because of the amateur radio equipment which is aboard the ISS (International Space Station).

d) International Aviation Navigational Aids

Another example of how CW lives on in modern communication and transportation systems is its use as an “identifier” for navigation aids (NAVAIDs) in the international air transport system. As a commercial pilot I used NAVAIDs on every flight, and the correct identification of these navigational stations was critical to safe air operations.

There are two types of “traditional” NAVAIDs: VORs and NDBs. VORs (“VHF OmniRange” stations) operate in the VHF range (below the 2m amateur radio band) and provide directional guidance to aircraft. Aircraft can fly “to” or “from” a VOR on any of 360 headings, called “radials”. NDBs operate in the 200-500 KHz region just below the AM broadcast band, and provide no directional information to aircraft. Nonetheless, an aircraft can fly “to” or “from” an NDB in a chosen direction by utilizing the aircraft’s magnetic compass in combination with the non-

Figure 5 – “Emergency Key” Description on the Apollo Spacecraft [4]

SPACECRAFT USB CHARACTERISTICS	
1. POWER AMPLIFIER - TWT POWER OUTPUT - 20, 5 WATTS	4. VOICE SUBCARRIER - 1.25 Mc MODULATION - 300 TO 3000 cps VOICE + 7 CHANNELS OF BIOMEDICAL DATA
2. ANTENNAS OMNIDIRECTIONAL (NEAR EARTH THRU TRANSPPOSITION) HIGH GAIN (28 db) (AFTER TRANSPPOSITION AND LUNAR)	5. TELEMETRY SUBCARRIER - 1.024 Mc BI-PHASE MODULATED AT 51.2 kbps - HIGH DATA RATE 1.6 kbps - LOW DATA RATE
3. CARRIER FREQUENCIES 2287.5 Mc - COMMAND MODULE PM CARRIER 2272.5 Mc - COMMAND MODULE FM CARRIER 2282.5 Mc - LEM OR SIV-B PM CARRIER 2277.5 Mc - SIV-B FM TELEMETRY CARRIER 2282.5 Mc - CAN ALSO BE USED IN FM MODE FROM LEM NOTE: ALL PM SPACECRAFT CARRIERS ARE 240 221 x GROUND PM CARRIER	6. FM TELEVISION 500 kc MODULATION 320 LINES 10 FRAMES/SEC
	7. EMERGENCY KEY 512 kc SUBCARRIER MANUALLY KEYED AND MODULATED DIRECTLY ON CARRIER

Figure 10. Spacecraft Unified S-Band Characteristics

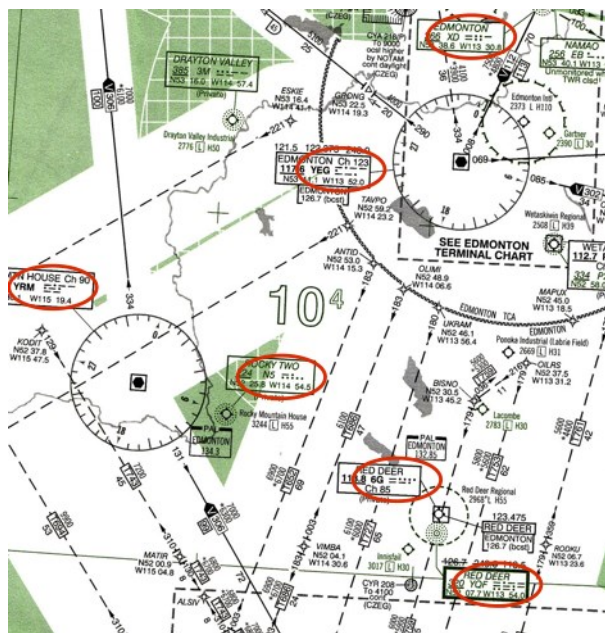


Figure 6 - CW NAVAID Identification on IFR Navigational Chart [5]

directional signal from the NDB. In fact, NDB stands for “Non-Directional Beacon”).

As older technologies, both types of NAVAIDs are now augmented by GPS-based navigation systems which increase the accuracy of aircraft navigation, but the traditional NAVAIDs are being left in place as backup facilities in the unlikely event of failure of the GPS-based systems. Some nations well-covered by VORs such as the USA are decommissioning NDBs, but that is not the case in Canada because of the need for them particularly in the sparsely populated northern section of our country.

Commercial and instrument-rated pilots used to have to pass a receive-only CW examination as a condition of licensing. This requirement was discontinued by the 1970s.

Both NDBs and VORs identify themselves to pilots in CW. The frequency of the NAVAID and its identifier are indicated on all navigation charts. In Figure 6 you can see the identification code (e.g. “YEG”) and the “dots and dashes” CW equivalent.

The “dots and dashes” on the charts are used by pilots to confirm that they have heard the correct identifier. NAVAIDs transmit their CW identifiers at 5 words per minute (WPM) every 10-15 seconds to ensure accurate reception by cockpit crew.

e) SMS Messaging

Nokia is a Finnish company that was started way back in 1865 [6]. It was one of the first companies to support SMS messaging and has included this functionality in its cellular phones since 1993. Nokia chose to notify users that an SMS message had arrived by playing “SMS” in CW on the phone’s beeper.

See [7] for a very short YouTube video that demonstrates this functionality. Nokia also used CW for other messages on the phone, as demonstrated in the video [7] and at [8].

f) CW Used to Encode Malware

This last example is very interesting. It shows the lengths to which cybercriminals and hackers will go to evade malware detection services and virus scanners on corporate and personal computer systems.

It is ironic as well, because the use of CW to deliver malware in the manner I will describe is a very creative use of one of the oldest communication technologies to enable the most advanced malware that is being developed by hackers today. There must be a ham in these criminal groups somewhere, as a non-ham would probably never have thought of this creative malware delivery scheme!

“Malware” is malicious computer code that is installed on a target computer system to steal information or wreak havoc and force the victim to pay a ransom. Virus scanners and other malware detection software work by scanning all of the computer’s network activity and looking for the “signatures” of malware computer code. A lot of malware loads itself onto target systems in a well-understood

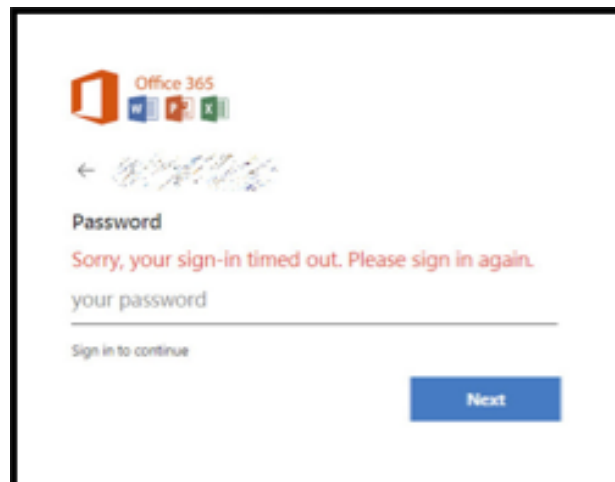
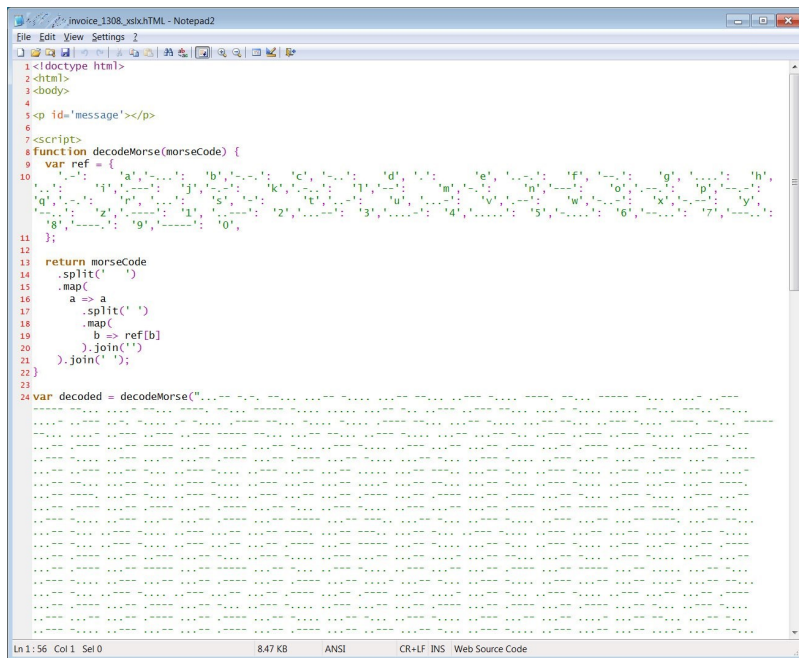


Figure 7 [left] Malware Morse Code Conversion Function [9], and Figure 8 [above] Malicious Dialog Box Asking for Username/Password [9]

manner, so virus scanners and the like generally “know” what malware looks like by its format and structure.

It is a bit of a “cat and mouse” game: once malware becomes well-known and is detected by anti-malware software, the attackers modify their code so that it will evade this new method of detection. Next move: the anti-malware companies then update their detection processes, and the game continues. Malware writers have the upper hand because anti-malware software sometimes cannot detect these new “attack vectors”.

In early 2021 a new form of malware popped up that used Morse code (more specifically, a text-based encoding of the malware using “dots and dashes”) to attempt to hide the “payload” (or damaging, functional components) of malware from detection by anti-virus/anti-malware software that scanned web pages for malicious content [9]. The payload of the malware could not be detected by the scanners because it was imported onto the target system in Morse code, not in the

usual binary format. Once the Morse code malware reached the target system, it would transform itself to binary format (i.e. computer code) and perform its malicious work.

This was very creative, and the malware made some successful incursions into target systems before the anti-malware companies could figure out how the malware was evading their detection processes.

The malware was delivered by a phishing attack that was sent to unsuspecting users via email. If the user clicked on an included link, then the Morse code payload would be delivered (evading standard anti-phishing detection) and transformed back into HTML code which would render a fake web page requesting the user's login credentials. See Figures 7 and X for some details.

This was certainly creative use of an old technology in a modern context.

g) Popular Culture:



Figure 9 – Morse Code in Popular Culture [15]

CW has played a role in television, movies, graphic novels, music, and popular culture for decades. In television and the movies, CW is commonly used as a tool to add dramatic effect to a scene and tacitly focus the audience's attention when "critical information" is received by one of the principal characters. CW has also been used to imply secrecy or technological complexity, such as in *Star Trek* [16] or the movie *"Enemy of the State"* where several scenes of spy satellites in orbit and tracking the protagonist are always accompanied by the sound of CW [10].

It is fun to try to decode these "secret messages". Often the "CW" is not proper Morse code at all, but gibberish. This has been more common in recent decades as use of CW has lessened in industry and the military. In some cases, however, actual CW is used in the production, and decoding of the message can be humorous: a 1960s episode of *"The Avengers"* (a popular television spy series at the time) used CW for dramatic effect. The message translated to "watch The Avengers every week" [11].

Morse code is a recurring element of popular music. Bands utilizing the effect include Pink Floyd, Duran Duran, Metallica, the Beatles, and most notably, the singer [Natalia Gutierrez Y Angelo in her 2010 single "Better Days"](#) [12].



Figure 10 – "Better Days" – Listen for CW Message

"Better Days" was written in cooperation with a government intelligence service to send a message to several hostages in South America who had been abducted by an anti-government revolutionary group. Some of the hostages had been held for over ten years despite their government's attempts to locate and free them. Written in Spanish, the message is embedded in an instrumental bridge between verses of the song.

The message translates to (English equivalent):

"19 people rescued. You are next. Don't lose hope."

The message was intended to boost morale among the hostages, most of whom had military communications training, including CW. The message was repeated three times throughout the song [13].

g) Summary

We can see from these examples that CW was used in many fields and in varied forms outside of amateur radio, and that use of "the code" is still of value to many people today.

The use of CW within amateur radio continues to be popular and places the operator in a select subset of hams who still know and use this venerable mode. There are many reasons for

learning the code today. In particular, the use of CW recognizes the mode's role in the foundation of the science and art of telecommunication.

Learning CW

In the remaining space, let's look very briefly at learning CW and getting the CW endorsement for your amateur certificate. Here are some tips for those SARC members who will be joining the next CW course in the new year.

Copying (that is, receiving and interpreting) CW is an aural (or ear-based) skill. Each symbol (letter, number or punctuation mark) has a corresponding sound. You will learn to hear a symbol, recognize it, and record its text equivalent (A-Z, 0-9 et cetera).

CW symbols are formed by combinations of the sounds "dit" and "dah". You need to learn the sound (more properly, learn the *rhythm*) of each symbol. "C" needs to be learned as "dahdidahdit"; "Q" as "dahdahdidah".

The CW course will emphasize the unique sound or rhythm of each English language letter, number, and punctuation mark.

You will learn the letters, numbers, and symbols of CW in logical groups, as many of the rhythms have related sounds.

Repetition in class and sufficient practise at home will have you accurately copying CW in almost no time. If it seems daunting, remember this: thousands of hams have successfully learned CW. There is no reason that YOU can't too!

Note that when sounding out these rhythms the trailing 't' in 'dit' is not sounded unless the 'dit' is the last sound of the rhythm. We will be spending a lot of time on recognizing these rhythms in the CW class.

It is critical (not just important!) that you do not try to learn CW by looking at charts or tables that depict each letter and symbol using '.' and '-' symbols. See Figure 11 for what **not** to use!

Charts like these undermine learning and must be avoided if you want to learn the code! Do we learn to read by listening to audio books? We don't learn penmanship by listening to an audio course. An aural skill like CW must be learned aurally.

If you have a smartphone app that is intended to help you learn CW, please do **not** use it until you start the course. Many of the apps utilize ineffective learning methodologies. Things learned in error are very difficult to undo, so leave that smartphone app alone until we start the course.

Lastly, if you have a hand key or keyer, do **not** spend any time trying to learn how to send CW! Self-teaching in this area is almost always counterproductive and will hamper your future learning, when you are trying to send CW symbols correctly. You will have to "unlearn" incorrect behaviour!

Much more to come on this topic in the 2022 CW course, or possibly in a further column.

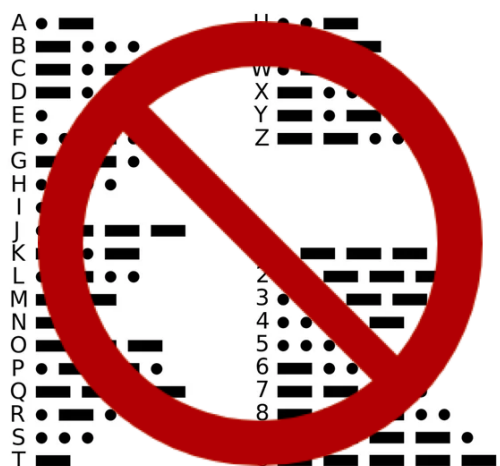


Figure 11 -
Ineffective CW
Learning Tool [14]

Conclusion

That's it for this month. I hope that you found the background information on CW interesting, and that you hadn't heard about all of these interesting uses of CW by industry, military forces, the space program, flight navigation, and in popular culture.

If you're in the CW course I look forward to working with you, to help you work towards your CW endorsement.

The latest word is that the course will have to be pushed back one month due to COVID-19 concerns and the "Omicron" variant.

We can't go online because of the real time, interactive nature of learning all the symbols.

Feedback on this article can be directed to the Editor, or directly to me at mcquiggi@sfu.ca.

All the best for 2022 and 73,

~ Kevin VE7ZD / KN7Q

References:

- [1] See https://en.wikipedia.org/wiki/Morse_code#International_Morse_Code
- [2] For some informative background on the "Victory Nickel" see <https://drenigma.org/2021/09/21/canadas-coded-coin/>.
- [3] The slides from the presentation are online at https://www.qnuradio.org/grcon/grcon19/presentations/The_Apollo_Communication_system/.
- [4] Apollo Unified S-Band System ([1.7 Mb](#)); K.E. Peltzer, Manned Flight Support Office, Goddard Space Flight Center, April 1966; NASA TM-X-55492 / X-506-66-156. See <https://history.nasa.gov/alsj/TM-X55492.pdf>
- [5] NAVAIDs from current Nav Canada IFR Chart LE12, from <https://www.navcanada.ca/en/>.
- [6] See <https://en.wikipedia.org/wiki/Nokia>.
- [7] Nokia "SMS" message at <https://www.youtube.com/watch?v=9QWez2Siw4g>.
- [8] SMS: "Early Nokia phones would beep ' ... -- ... ' when a message was received - Morse code for SMS." See <https://sound-au.com/articles/morse-code.htm>
- [9] See the story by Lawrence Abramson describing this novel malware at <https://www.bleepingcomputer.com/news/security/new-phishing-attack-uses-morse-code-to-hide-malicious-urls/>.
- [10] "Enemy of the State", 1998. <https://www.imdb.com/title/tt0120660/>. Satellite is depicted to be sending a continuous "CQ CQ CQ..."
- [11] Lloyd McQuiggin (the author's father), in a discussion from the mid-1970s.
- [12] See <https://the-daily-dabble.com/morse-code-music-movies/>.
- [13] A story about "Better Days" and the embedded CW message is at <https://www.theverge.com/2015/1/7/7483235/the-code-colombian-army-morsecode-hostages>.
- [14] <https://modernout.com/pages/morse-code-chart>.
- [15] From <https://tvtropes.org/pmwiki/pmwiki.php/Main/EveryoneKnowsMorse>.
- [16] See <https://memory-alpha.fandom.com/wiki/CQ> re the original series episode "Space Seed" (1967).
- [17] https://en.wikipedia.org/wiki/Spark-gap_transmitter.
- [18] See https://en.wikipedia.org/wiki/Spark-gap_transmitter#Obsolescence
- [19] See <https://www.mint.ca>.

TECH TOPICS

Arie Kleingeld PA3A



A vertical array for 30m

An Antenna Project

The idea for this antenna project originates from Les EA5AVL (SK) who built the '40m Compact 4-Square Antenna'. A very nice concept indeed, 4 wire verticals and only one supporting mast. I always wanted to try this one out and decided to build a light weight 30m version of it for portable use, perhaps a DXpedition. I wanted to design it from scratch, using EZNEC and not scaling the original design. There were constraints though: all antenna components had to come from the PA3A junkbox and the array should be light weight and portable. The design is made visible in the EZNEC Antenna View above.

A 4 Vertical Array (like a 4-square) for 30 meters

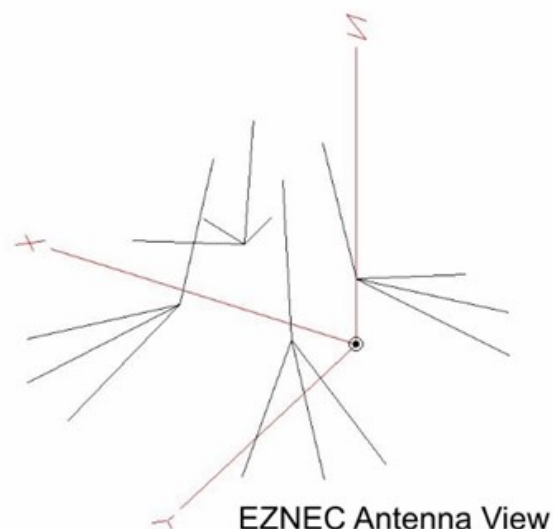
The antenna set-up has one radiator and 3 reflectors. All elements are a sort of sloping dipoles and have the same length. To let 3 elements behave as a reflector, they need to be loaded with an inductance. This is an easy job if you know that a quarter wave transmission line converts a capacitive reactance to an inductive one. A brilliant idea that was implemented in EA5AVL's antenna. Different from the original design

of connecting all reflectors to one common capacitor, I decided to connect each reflector to its own capacitor and decouple the quarter wave coax feedlines with simple common mode chokes. With this concept common mode currents are reduced, simulation in EZNEC is clean and easy, and it turned out to give a realistic outcome.

EZNEC

So, the EZNEC (NEC2) homework was done. Length of all quarter wave element wires came to about 6,65m, which seems a bit short for 10 MHz but all wires are covered with 0,75mm PVC coating which has a shortening effect. Playing with the height of the array above ground level and separation distance of the elements gave a nice insight of the possibilities in gain and F/B ratio. Being constrained by the support structure I settled for:

- Top of antenna at about 9m
- Separation of the wires at the top as in a 4-square with sides of 3m (so 2,25m from middle support mast)
- Separation of the feed points at about 3,5m from the middle support mast (as a 4-square with 5m sides)



The EZNEC prediction with these dimensions was about 3dB gain over a single groundplane antenna and a F/B ratio of 15-20 dB for modest elevation angles (see the EZNEC graphs below). SWR would turn out to be about 1 : 1.3 or better at the resonance frequency. And after building and tuning, I could conclude that this was a very accurate prediction! Never been so close to reality with EZNEC. You can download the EZNEC-file at:

<https://pa3a.nl/wp-content/uploads/2021/11/PA3A-30m-4-Vertical-Array.zip>

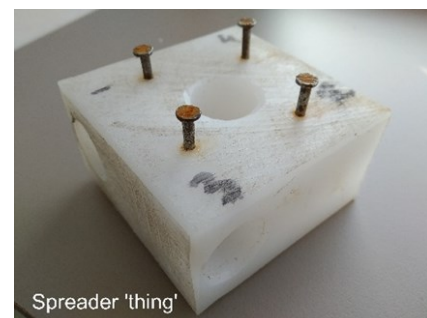
The Actual Build

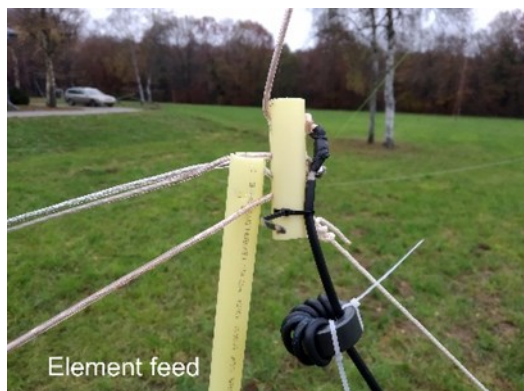
Setting things up for the first time is not a quick job. Cutting all wires to the right length, measuring the velocity factor of the coax (came down to 0.66, as in the specs) and cut 4 quarter wave feedlines, soldering it all together, construction of an antenna switch, lots of guy wires, etc. and finally tuning it all to the 30m band.

Tip: to measure the exact impedance of the radiator, connect the antenna analyzer to the relay box via another quarter wavelength 50 ohm coax cable. This way you will measure the antenna via a half wave transmission line.

Components of the contraption

- 12m vertical of Spiderbeam (set to about 9m)
- PVC pipe spreaders and supports
- A spreader 'thing' made by Mart PH0MH (snug fit for PVC pipes) to connect the horizontal PVC pipes to the mast
- Loudspeaker feeder cable as antenna wire
- 4 x 1/4 wave 50 ohm RG-58CU coax feed (length about 4.88m) with common mode chokes
- All elements connected to a capacitor of 440 pF ($= 2 \times 220$ pF) in the switch box through a 1/4 wave coax cable
- CAT-6 cable to switch the relay box
- (Too) many guy-lines
- Switching relays in the box are capable of handling 16A - 240V; they were donated by Henk PA3D





- The switchbox is at the centre near the Spiderbeam mast. A deactivated relay connects each 1/4 wave feeder to its 440pF cap. If one of the four relays is activated, it switches one element (the radiator) to the transmitter coax, the other three elements stay connected to their 440 pF caps and act as reflectors.

Results

The performance of this array was better than I expected. It's an antenna with parasitic verticals and my experience is that the results of such a system is different from a regular 4-square antenna with 4 RF-fed verticals and a good radial system. Well, it held up pretty good and came close to what EZNEC predicted. Probably because the verticals were more like sloping dipoles, so that the radials were not on the ground but were elevated. Difference in gain compared to the reference antenna (a groundplane antenna with 4 radials about 100m away from the 4-square) was not much, but there was a clear difference in S/N ratio because of the directivity of the 4-square. The F/B ratio was very satisfying. Front, side and back of the array were clearly distinguishable.

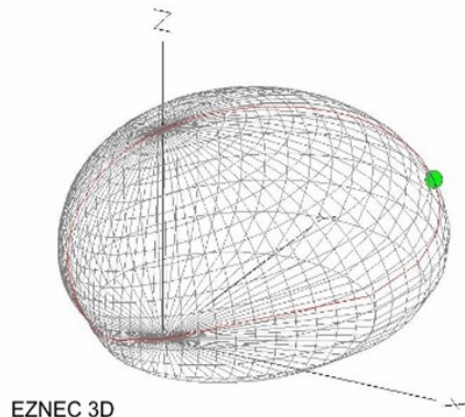
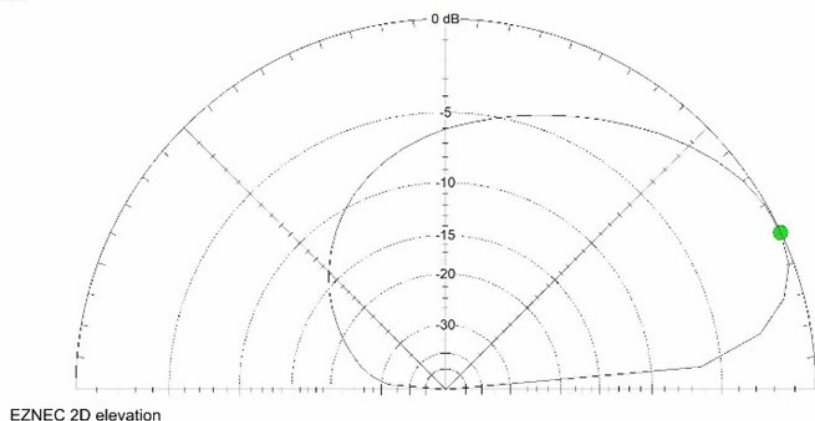
Demonstration of Results on YouTube

For a good view on the antenna array and for demonstration of the F/B ratio, I made this 2-minute YouTube video:
https://www.youtube.com/watch?v=V5kWw_9Mlgo

In the video you will get a good view on the antenna as set up on location in Luxembourg and there's an audio recording of a QSO on 30m which shows a satisfying F/B ratio. Audio recording was made with an Elecraft K3 and Audacity.

EZNEC Graphs of the 4 Vertical Array

Total Field

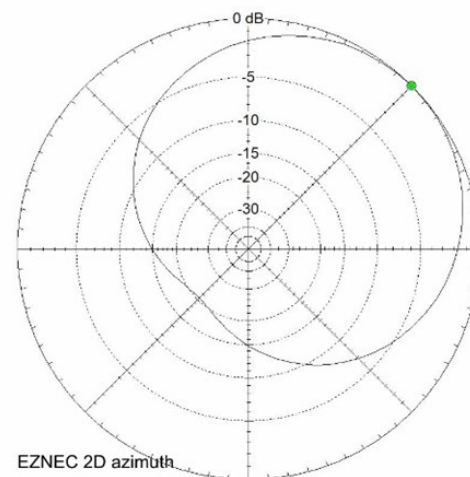


Link to the EA5AVL article (pdf):

<https://rsars.files.wordpress.com/2013/01/40-m-compact-4-square-antenna-ea5avl-11.pdf>

73,

~ Arie Kleingeld PA3A



W7EL retiring—EZ-NEC will be free in 2022

On January 1, 2022 I will be retiring. I'll be nearly 76 and want to spend more time at other things. EZNEC is and always has been developed, sold, and supported only by me, so all development, sales, and support will end at that time. For several reasons there is no practical way to sell or transfer ownership to someone else, so here's what will happen on that date:

EZNEC will be released to the public domain and become free of cost and can be freely copied and distributed. I do not plan to release the source code. Click [here](#) for more information.

There will be one or two EZNEC program types:

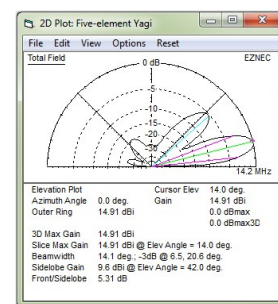
- EZNEC Pro. This will have all the features of the current EZNEC Pro/2 (internal NEC-2 calculating engine) and will additionally be able to run external compiled NEC-4.2 and NEC-5 programs furnished by the user.
- EZNEC+. EZNEC Pro uses some advanced memory management methods to accommodate its upper limit of 45,000 segments, and this may cause trouble on some systems. So I might also make

available EZNEC+ which has simpler memory handling. However, I'll investigate the possibility of making this unnecessary.

No programs will require a hardware key or other additional device.

You, my customers, have been wonderful. I've enjoyed interacting with you and learned a great deal by doing so. You've been courteous, thoughtful, patient, and honest beyond all expectations. You've enabled me to escape the Dilbert cartoon and have the dream job of being a one person home-based company for 26 years, with no bosses and no employees. It hasn't brought me more than a modest income, but getting rich has never been my goal -- along with occasional consulting it has provided an adequate income and a much, much, more pleasant and stress-free life than a career at a large corporation (or even most small companies). I hope that what I've been able to provide has been a fair exchange.

~ Roy Lewallen, W7EL



...more

TECH TOPICS

Adam Farson VA7OJ/AB4OJ

FM, Land-Mobile Radio and the Amateur Radio Service — a brief history

Introduction

In this article, a brief overview of the underlying theory will show why FM is superior to amplitude-modulated emissions in the land and maritime mobile radio services above 30 MHz. A brief history of the evolution of these services, in civilian and military spheres, will follow. The impact of these developments on the Amateur Radio Service will also be discussed.

In keeping with the author's experience, developments in the United States will receive the most coverage, although European contributions (especially in the military arena) will also be discussed in some detail.

First, a bit of theory

A quick comparison of FM with SSB is interesting. Let us consider how path performance degrades with increasing path loss for each emission type. The curves in Fig.1 [right] are illustrative.

It will be seen that SSB has a linear relationship between path loss and S/N (as does AM); there is no threshold "knee" as such. Modern DSP-based, heuristic noise-reduction (NR) techniques can often extract a usable baseband when the SSB signal is "down in the

noise" ($S/N < 3$ dB). This has certainly been my experience with modern DSP-based HF transceivers, for example.

With FM, when the threshold is reached with increasing path loss, the S/N will degrade much more rapidly than for the SSB case, but intelligible voice audio is recoverable 3 to 6 dB below threshold - as long as incidental AM due to man-made noise is not too severe. Threshold-extension techniques (e.g. using a PLL demodulator with a loop filter cutting off at fm) can push the threshold back along the path-loss axis as much as 7 dB.

Important definitions

FM modulation index $m = \Delta f / f_m$ where Δf = peak deviation and f_m = highest modulating frequency.

Carson's rule:
 $TBW \sim 2 * (\Delta f + f_m)$
where TBW = transmitted occupied bandwidth.

A characteristic of FM is that as m increases, the S/N above threshold will be higher for a given

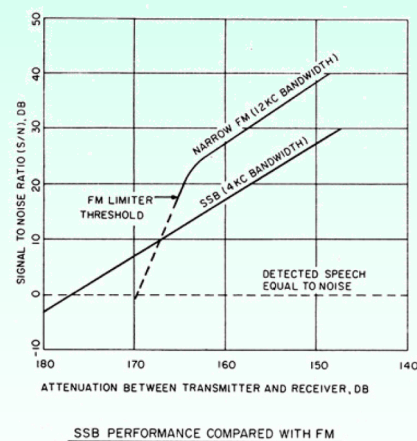


Fig.1: Simplified S/N vs. path loss curve for FM & SSB.

path loss, but the threshold "knee" moves to the right with increasing m . For $m = 1$ (typical in VHF or UHF FM systems with $\Delta f = \pm 2.5$ kHz and $f_m = 2.5$ kHz), the Carson's-rule occupied bandwidth is $2(2.5 + 2.5) = 10$ kHz. Compare this to 2.5 kHz occupied bandwidth for a typical SSB signal, which will be intelligible at path loss values well below the FM threshold.

Note that when path loss is sufficiently low to fully saturate the FM receiver's limiter (**full quieting**), S/N will be higher than for the same path loss value in the SSB case. (In the example shown in Fig. 1, this occurs at 150 to 160 dB path loss.) The reason for this is that AM noise which would be fully suppressed in the FM receiver will still appear in the SSB receiver's baseband output. Thus, if we can engineer our FM system for at least 10 dB of fade margin (headroom), overall path performance will exceed that of a comparable SSB (or AM) system.

Another advantage of FM is the **capture effect**. If two incident co-channel signals differ in amplitude by 6 dB or more, the FM receiver will capture the stronger signal and suppress the weaker. This confers greater immunity from accidental or intentional co-channel interference.

Yet another factor favoring FM (as compared to AM) is that for a given transmitter output the primary power input is significantly less, as the high-level modulator stage is eliminated. This has obvious implications in mobile and portable radio designs.

These considerations drove the adoption of FM in land-mobile radio (LMR) as well as short-haul maritime R/T communications. Nowadays,

virtually all short-range and inshore maritime radio communications are FM, in the 156-162 MHz range.

During the 1930s, mobile two-way radio communications systems came into use as technology made possible the design of transmitters which could be operated in vehicles. The advent of frequency modulation (FM) provided much clearer and less noisy transmissions, free from vehicular static. Almost all mobile systems operated below 40 MHz, since little was known about propagation at frequencies above that range, particularly in urban environments. However, research on the propagation of higher frequencies continued almost continuously from that time on.

The first significant FM LMR system was the Connecticut State Police low-band radio communications network, using sets designed and built by Daniel Noble and Fred M. Link. Soon, Noble joined Galvin Corporation (later Motorola). Galvin launched its own line of FM public-safety radio sets in approximately 1941.

The early successes of FM in US public-safety, local-government, and commercial radio services led directly to the widespread deployment of 27 - 55 MHz FM tactical radio equipment in the US Army Signal Corps. To speed the adoption of FM, Edwin Armstrong freely licensed his FM patents to the US Government. By late 1943 to mid-1944, mobile and portable US-built FM sets, manufactured by Galvin, Link, RCA and others, were available to the US Army Signal Corps. Examples were the SCR-610 mobile and BC-1000 manpack. Transmitter power levels ranged from 0.5W or so for manpacks to 15W for mobiles. World War II



Another advantage of FM is the capture effect. If two incident co-channel signals differ in amplitude by 6 dB or more, the FM receiver will capture the stronger signal and suppress the weaker.

demonstrated the superiority of FM transmission, which proved easier to use and more difficult to jam than the VHF AM systems in use by the Axis forces. Only U.S. forces used significant numbers of FM tactical ground radio systems.

Following WW II, many ex-servicemen returned to "civvy street" with a knowledge of radio technology and an appreciation of the value and convenience of mobile radio communications. Former military radiomen found ready and lucrative employment as maintenance technicians and installers serving the rapid growth of these new radio systems. Training courses for the coveted FCC Radiotelephone Operator's Licence (then required by law for LMR radio maintainers) sprang up in many cities and were funded by veterans' education programs.

The late 1940s were equally important years for other aspects of mobile radio. AT&T introduced the first commercial public land mobile radio-telephone system in St. Louis in 1946. However, service was limited by a lack of channels, and the system was cumbersome to use, with half-duplex "push-to-talk" and manual connections via telephone-company "Mobile" operators. Nonetheless, 25 U.S. cities had public mobile telephone service by year's end. This system was termed MTS (Mobile Telephone Service).

As the demand for mobile telephony increased, the FCC assigned additional channels; IMTS (Improved Mobile Telephone Service) supplanted MTS. IMTS featured up to 12 channels with automatic idle-channel selection, full-duplex working and direct subscriber dialing from the mobile as well as the fixed side. Analogue FM cellular service began to displace IMTS in the early 1980's.

Some surplus military radio equipment entered civilian life as low-band taxi dispatch radios, especially in New York and other cities. One should note, though, that ever more stringent FCC equipment certification

requirements locked military surplus (except for military variants of previously-certified civilian radios) completely out of the LMR market by the early 1950's.

Development of specialized vacuum tubes with useful gain at VHF (some based on German designs), and the need to operate above the highest range of enemy intercept receivers, drove the development of 100 - 156 MHz AM air-to-air and ground-to-air radio. **Why AM rather than FM?** Unlike FM, AM has no capture effect. This is vital in air-traffic control; if two aircraft are co-channel, the controller will be able to hear both. For this reason, 108-137 MHz (VHF) and 225 - 400 MHz (military UHF) use AM, not FM, to this day.

It should be noted here that during the war, several US law-enforcement agencies took advantage of the new high-band VHF technology by installing 118 MHz FM systems including mobile radios, and mountaintop links. After the war, the FCC allocated 30-50, 150-174 and 450-470 MHz (later expanded to 512 MHz) to LMR services and reassigned the 118 MHz band to the aeronautical radio service.

Influence of LMR technology on the Amateur Radio Service (ARS)

Prior to, and immediately after WW II, all VHF R/T in the ARS was AM. For reasons which I have never fully understood, the immense advantages of FM over AM for local VHF/UHF radiotelephone communications were barely, if ever realized in the ARS until a US regulatory change in 1963 stood the whole thing on its head. The shift from AM to NBFM in the VHF bands started in the US.

In 1963, the FCC mandated an occupied-bandwidth change in the LMR bands (30- 50, 150.8 - 174 and 450 - 470 MHz) from 36 kHz to 16 kHz. Channel spacings of 60 kHz (VHF) and 50 kHz (UHF) were halved; peak deviation was reduced from 15 to 5 kHz.

Some existing sets could be "narrow-banded" by fitting narrower IF filters and turning down the deviation, but most were not economically modifiable. These sets were replaced with newer, narrow-band models, and the old sets found their way onto the surplus market. In no time at all, of course, enterprising hams had snapped them up and converted them to 2m and 70cm. A smaller number found their way onto 6m, which was never as popular due to TVI issues with VHF Channel 2 (54 - 60 MHz).

When the FCC authorized amateur repeaters shortly thereafter, amateur FM operation really took off as the popular mode par excellence, and all but eclipsed AM. Hams built repeaters out of mobiles, and converted retired commercial base stations. As the number of amateur FM operators proliferated - especially in California and on the US Eastern Seaboard - the ARS also switched to 5 kHz peak deviation, where it remains to this day.

Innovative amateur groups built up extensive repeater networks, with multiple receiver sites and voters for optimum handheld coverage. Other groups, especially in the western states, engineered "intertie" networks linking repeaters and remote-controlled base stations via UHF-FM point-to-point links. Telephone-line interconnects, enabling a repeater user to place a call from his radio set to the public telephone network, were also provided where allowed (or at least tolerated) by telephone-company policy. These systems undoubtedly saved many lives.

Most of this network deployment was accomplished using retired LMR equipment.

As the supply of surplus dried up, ham-equipment manufacturers started offering 6m, 2m and 70cm mobiles and handhelds, along with a few base-type radios. These were the progenitors of the modern, feature-laden dual- or multi-band FM mobile or handheld so popular among today's hams. Due to cost considerations, these wide-range multi-band sets do not have the front-end protection inherent to an LMR transceiver and are thus subject to IMD and cross-modulation in high-RF areas. Thus, a demanding amateur will often prefer a "retired" LMR radio.

There is no doubt whatsoever that the huge increase in traffic on the 2m and 70cm amateur bands brought about by FM and repeaters has materially strengthened the argument for amateur retention of these bands. It is regrettable, though, that radio amateurs did not more exhaustively explore the benefits of threshold-extension demodulators for weak-signal FM working.

One of the most significant milestones was the release of surplus battery-operated portable FM equipment, especially handhelds, into the ham market. This equipment was hitherto unaffordable by hams. Handhelds such as the famous Motorola HT-220 were the most reliable pieces of gear a ham could own; they also ushered in the era of personal portable communications in the ARS. The handheld/repeater combination revolutionized amateur emergency communications, putting them almost on a par with public-safety radio systems. In fact, many countries have



One of the most significant milestones was the release of surplus battery-operated portable FM equipment, especially handhelds, into the ham market.



The German Kleinfunksprecher D" had 0.25 to 0.5W output, in the 30 - 55 MHz range

integrated their national amateur radio societies into their emergency-planning operations, and for the first time ever (at WRC 2003) the ITU formally defined a disaster-communications role for the Amateur Radio Service.

Developments in Europe

Prior to WW II, the German and Dutch radio industries had discovered the virtues of line-of-sight propagation for urban mobile radio communications. This drove the deployment of VHF R/T systems in the 30 - 55 MHz band, and later (after WW II) in the 66 - 88 MHz band. The following statement from a pre-war German planning document is astounding: "Equipping *Panzer* troops with VHF radio enabled individual units to be tied into the command network. The control over fast-moving combat forces gave the *Wehrmacht* operational advantages." It has been said that tactical VHF radio was the "central nervous system" of the *Blitzkrieg*, as it facilitated the integrated command and control of infantry, armor and close air support. The German mobile VHF transmitters had 10 to 15W output; portables such as the "*Kleinfunksprecher D*" had 0.25 to 0.5W output, in the 30 - 55 MHz range.

Interestingly, two German airborne VHF radio sets - the FuG 15 (38 - 47 MHz) and the FuG 18 (24 -75 MHz) supported both AM and FM. These sets were developed in 1943-44. The FuG18 was a transceiver in the modern sense, with a common master oscillator and an up-

converting transmitter. The reason for the inclusion of FM is unclear, but this mode may have been intended for use in *Funkspiel* (radio deception) operations against the RAF Ascension FM agent radio system¹, and perhaps even against US Army tactical VHF-FM nets after D-Day. (In this connection, it is noteworthy that one of Edwin Armstrong's engineers absconded to Germany in 1941 with a full set of his employer's FM notes. He was never caught.)

Manufacturers such as Siemens, Telefunken and Philips (Valvo in Germany) responded to this need with the surprisingly rapid development of suitable tubes. Some captured German VHF sets found their way to the US; Bell Labs received several of the excellent VHF tubes used in these sets. These designs gave rise to the famous "acorn" tube (e.g. 955) and frame-grid UHF tubes.

German successes with VHF tactical mobile radio in WW II fed directly into the deployment of such things as the 66 - 88 MHz FM LMR networks in post-war Germany. Examples are the national *Autobahnpolizei* network, and radio systems operated by urban public-transport agencies. In a manner paralleling developments in the US, European public and private entities adopted VHF FM land-mobile communications in the 66-88, 146-174 and 440-470 MHz bands starting in the 1950's. Manufacturers such as Pye (part of Philips after 1965), Storno, STC, Marconi and Motorola were the main equipment suppliers. As had occurred earlier in the US, the shift from 25 to 12.5 kHz channel spacing in the 1970's released significant quantities of LMR gear into the amateur community.

Military tactical VHF radio in the UK

In the British Army, the use of the VHF band (27-55 MHz) for tactical field radio was proposed during WW II, but there was considerable opposition to its use. This

¹ G. Pidgeon, "The Secret Wireless War", p. 100. UPSO, 2003. Ascension may have been the only British use of FM during WW II.

diffidence arose from entrenched use of ground-wave in the low HF range, uncertainties about VHF path performance in wooded or hilly country, and the requirement for sky-wave transmission on medium/long-haul circuits. The sky-wave requirement dominated the Army's radio-equipment policy until spectrum congestion, and severe night interference in the Far East, forced a re-examination of the problem.

Doubtless, a factor which accelerated the move to VHF was the considerable success attained first by German, and later by US Army forces in their use of the VHF band for infantry and armored formations, as well as for infantry/armor intercommunication. One should note that the British Army's gradual adoption of VHF came quite late in the war, and that they had German and US experience to build upon. It was nevertheless a bold venture, which ultimately succeeded. Even so, the British Army relied mainly on HF ground-wave, using low-powered sets in the 2 - 9 MHz range, right up to war's end. It did not fully commit to VHF FM until it standardized the WS88 FM manpack and the "Larkspur" radio family after WW II.

Recent trends

Ever-increasing pressure on available spectrum drove attempts to squeeze more channels into the available space, and also brought about major spectrum reallocations - mostly at the expense of the UHF TV bands, which were much less utilized than spectrum managers had anticipated when they were first assigned. In a few cases, under-used amateur spectrum was also reallocated - notably the 220-222 and 420-430 MHz ranges in Region 2. FM channel spacings were progressively reduced, first to 12.5 kHz, then to 6.25 kHz. At this narrow spacing, modulation index $m <$

1; thus, the S/N advantage of FM over AM is almost lost.

An alternative modulation method, ACSB (amplitude-compandored SSB) was proposed and tested in field trials in the 1990's, but proved to be so susceptible to AM noise and interference that the user community ultimately rejected it in favour of FM.

Various digital modulation systems have begun to take hold, especially in public-safety radio networks. In police and other local-government radio services, digital modulation methods are easily encrypted and can thus be made very secure. The major disadvantage of any digital modulation scheme is that the bit-error rate (BER) goes to infinity at the threshold; this causes loss of synchronization between the receiver and transmitter, destroying the link. To ensure acceptable fade margins, these systems must be engineered with a larger number of base stations and repeaters, and higher ERP.

So, we finally come back to the "old standby", FM. It will still "get through" in a wide variety of topographical situations and equipment configurations, with relatively inexpensive equipment that is also easy to maintain and repair.

Acknowledgements

- The author wishes to thank Brian Austin G0GSF for his invaluable assistance and constructive comments in researching and preparing this article.
- Source for Figure 1: "A First Primer describing SSB", TMC, 1960.

~ Adam VA7OJ/AB4OJ

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*...we finally come
back to the "old
standby", FM. It will
still "get through..."*

*Adam is a member of
the North Shore
Amateur Radio Club,
and has written a
number of articles on a
variety of subjects.*

*You can find them at
Adam's website:
[https://
www.ab4oj.com/](https://www.ab4oj.com/)*

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TECH TOPICS

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Jim Andrews, KH6HTV

TinySA - an inexpensive test instrument for digital transmitters

The success of the NanoVNA led the folks who developed it to follow it with the companion TinySA, a Spectrum Analyzer, with equally impressive performance.

While it is billed as a spectrum analyzer, it is also an RF signal generator. The basic performance covers from 100 kHz to 350 MHz. It can also be used up to 960 MHz but with poorer performance. The price is astonishing low for what you get in this tiny package. I got mine from Amazon for about \$70 with next day delivery.

The best place to go for information, specs., instruction manual, PC program, etc. is the TinySA wiki web site: (www.tinysa.org/wiki/) I highly recommend you download the tinySA-App for your

Windows PC. See Fig. 3 on the next page. It greatly increases the ease of use and capabilities of this fantastic instrument. The spectrum plots in this app. note were obtained using the PC. The wiki site is quick to point out that it does not have all of the capabilities of name brand spectrum analyzers and they do list the limitations you need to be aware of. But the price is right! They also caution you to be careful and not purchase imitation "clones" as they have inferior performance.

Googling "TinySA", you will find a lot of reviews of it's performance by hams. These reviews mainly deal with classical sine wave performance, with modulations such as AM, FM, etc. The focus of KH6HTV Video is on Amateur Television (ATV) and in particular

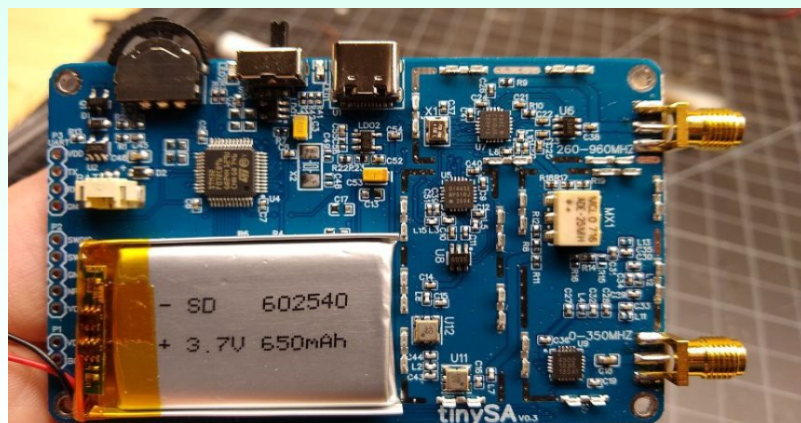
Portable TinySA Spectrum Analyzer

MF/HF/VHF output/input for 0.1MHz-350MHz

UHF output/input for 240MHz-960MHz



Fig. 2 A peek inside of the TinySA, Spectrum Analyzer



Digital Amateur Television (DATV). So it was natural for me to ask, how well can I measure the spectral performance of a digital TV transmitter. The rest of this application note will address this.

ITU specification

The ITU has specified how the spectrum of a digital TV signal should be measured. The analyzer settings, per the ITU, are: center frequency = DVB-T channel center frequency, Span = 20 MHz, Resolution Bandwidth = 30kHz,

Video Bandwidth = 300kHz, Sweep Time = 2 seconds, Detector = RMS, Signal Averaging = 10. The shoulder attenuation is measured at ± 200 kHz beyond the channel edges, i.e. ± 3.2 MHz from center frequency for a 6 MHz wide channel.

For further details, I refer the reader to the DTV "Bible" --- "Digital Video and Audio Broadcasting Technology", by Rhode & Schwarz engineer, Walter Fisher, page 426. [1]

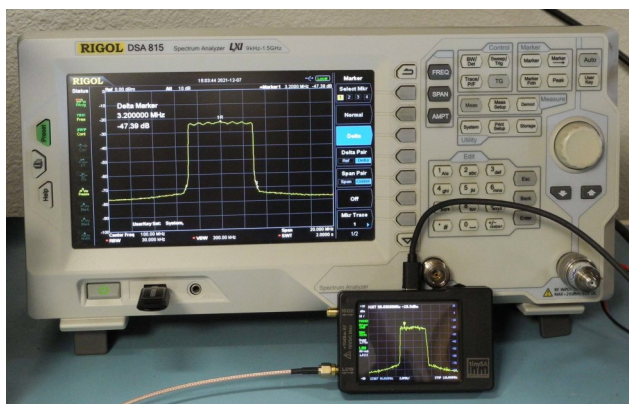


Fig. 4 The TinySA and the Rigol DSA-815 Spectrum Analyzers measuring a DTV signal.

Reference for comparison

I have been using now for several years a high quality spectrum analyzer to characterize my DTV amplifiers and transmitters. It is a Rigol model DSA-815, 1500 MHz spectrum analyzer with a built-in tracking generator. It cost about \$1,500. This app. note will compare

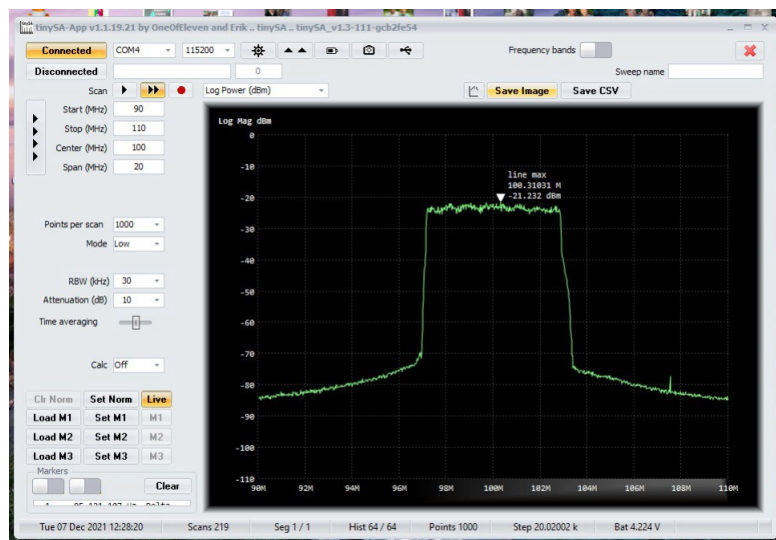


Fig. 3 This is what the TinySA-App control screen looks like on a Windows PC.

measurements made with the Rigol against the TinySA. The DTV signal source I used is a Hi-Des model HV-320E, DVB-T modulator. I set up the modulator to generate a 6 MHz bandwidth, QPSK signal of 0dBm signal strength. Fig. 5 shows this signal measured on the Rigol with the ITU settings. The center frequency was 100 MHz. The HV-320E covers frequencies up to 2.6GHz with an identical spectrum. Note the DTV energy is spread over a 6 MHz bandwidth. The analyzer's detector bandwidth is set to 30kHz and is only measuring the power in this narrow bandwidth. Thus the power level of the flat top shown in Fig. 5 is about -22dBm, but spread over 6 MHz. Thus when using 30 kHz BW for a 6 MHz BW DTV signal, an approximate power measurement can be made by reading the power at the center of the channel and then applying a +22dB correction factor.



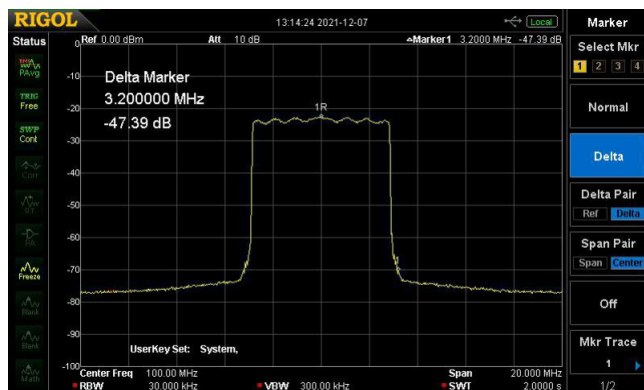


Fig. 5 HV-320E spectrum as measured on the Rigol DSA-815. Pin = 0dBm. Center frequency = 100 MHz, 20 MHz span, 30kHz resolution bandwidth, 300kHz video bandwidth, 2 second sweep time, RMS detector, 10 averages, 10dB/div & 2MHz/div.

Measurements with TinySA

The first measurement performed with the TinySA was with the same HV-320E signal as shown above in Fig. 4, but at a higher, 70cm frequency of 435 MHz. The DTV signal was input to the HIGH port of the TinySA and it was put in the UHF mode. The TinySA was set to duplicate as close as possible the same settings used on the Rigol SA. The center frequency was set to 435MHz with a span of 20 MHz. The TinySA tries to always use "Auto" to set up bandwidth and input attenuation. I forced it into manual mode via the PC program. I set the bandwidth to 30 kHz and input attenuation to 0 dB. Data points were set to 1000, and signal averaging was set to 8.

In the UHF mode, the TinySA does not have a good input attenuator, so a 10dB SMA attenuator was placed on it's SMA input. A -10dB correction factor was entered in the "Gain" menu to account for the attenuator in the vertical calibration scale factor.

Fig. 6 shows the result. This does not compare favorably with that seen on the Rigol, Fig. 5. The level of the flat top is approximately correct. But notice the horrible out of channel skirts on the spectrum.

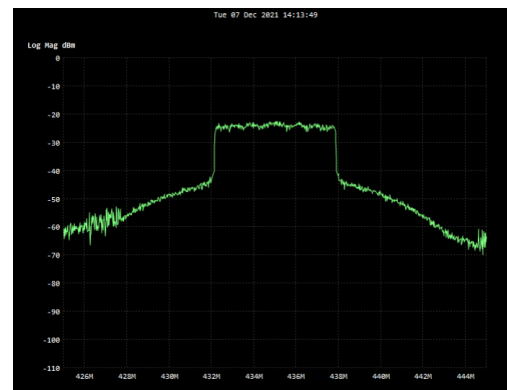


Fig. 6 435MHz, 6 MHz BW, 0dBm DTV signal measured directly on the TinySA, using the HIGH, UHF input.

These are false artifacts not present in the DTV signal. They are generated by severe non-linearity in the TinySA's UHF circuit. This result is obviously unacceptable.

The next test was to repeat the measurement but instead use the LOW input which covers MF, HF, & VHF bands (0.1 - 350 MHz). The measurement was done at 100 MHz. Fig. 7 below is the result. This now compares very favorably with the Rigol measurement, Fig. 5. The shoulder break points now at about the same level of > -45dB.

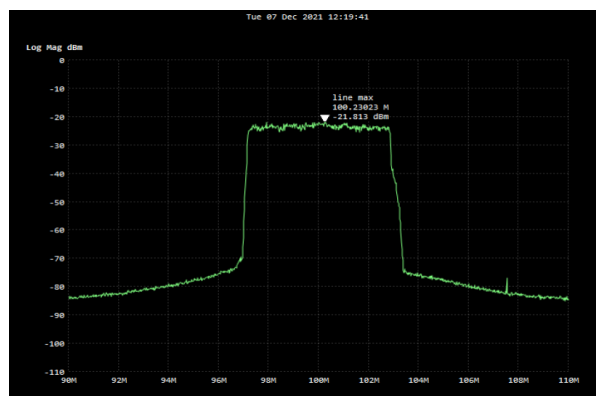


Fig. 7 100 MHz, 6 MHz BW, 0dBm DTV signal measured directly on the TinySA using the LOW, VHF input.

Conclusion

The TinySA will make accurate DTV spectrum measurements if the LOW, VHF input is used. The HIGH, UHF input should not be used.

Fig. 8 The better way to measure frequencies higher than 350 MHz

Mixer measurements

So to be able to measure our 70cm and higher frequency DTV transmitters, we need to instead go to a mixer scheme. Low cost mixers are available on-line these days. Fig 8 above shows a \$15, SMA mixer using a Mini-Circuits ADE-25MH double balanced diode mixer. The RF & LO are rated for 5 MHz to 2.5 GHz. The IF is rated for 5 MHz to 1.5 GHz. The LO requires +13dBm drive. I measured 7dB RF to IF down conversion loss. The TinySA vertical scale factor can be corrected for this loss by entering -7dB in the "Gain" menu.

There are quite a few, low cost choices for the LO. One possibility is to simply use another TinySA, not as a spectrum analyzer, but as a signal generator. Put in the HIGH-UHF OUT mode, it's frequency is programmable from 240 MHz to 960MHz. The output is a square wave. The max. output level per the menu is +16dBm. I actually measured it to be from +16 to +18dBm. The programmable level control was not very accurate. The LOW, MF-HF-VHF, signal generator is more accurate.

I ran some experiments with this mixer scheme to determine if accurate DTV measurements could be performed on the 70cm and 23cm bands. I used an IF of 100MHz for the 70cm band and set the LO to 335 MHz for an RF input of 435 MHz. For the 23cm band, I set the LO to the TinySA max. limit of 960 MHz. Thus for an RF input of 1243 MHz, the IF out was 283 MHz, which still fell with the LOW-VHF mode.

Fig. 9 shows the result of a test using a 23cm, 1243MHz, DVB-T signal. The RF power level was adjusted over a wide range to determine the limits of linearity. It shows the power

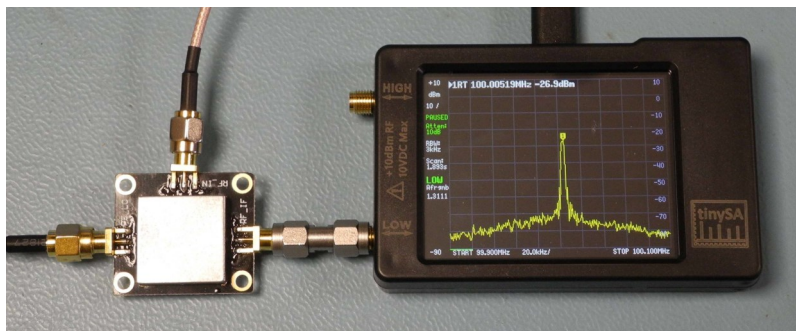


Fig. 8 The better way to measure frequencies higher than 350 MHz

stepped from 0dBm, to -3dBm to -5dBm. Note the improved skirts as the RF input power level is dropped. The conclusion drawn was that the input power should be kept below -3dBm and preferably below -5dBm. This experiment was also performed at 70cm and I obtained identical results.

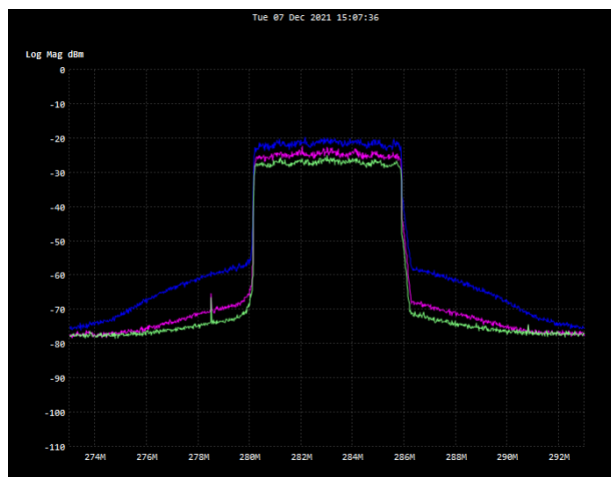


Fig 9 Test of the TinySa plus mixer to measure a 23cm, 1243MHz, DVB-T signal. RF input power level stepped to demonstrate non-linear compression at high input power. Blue trace is 0dBm, Magenta trace is -3dBm. Green trace is -5dBm.

Example of use

Fig. 10 below shows an example of using the TinySA with an external LO and mixer to measure the spectrum performance of a 70cm, RF linear power amplifier. The amplifier's output power was +35dBm (3.2 Watts).

A high power, 30dB attenuator followed by a 10dB attenuator was used to drop the signal level to the mixer down to about -5dBm.

You might ask why the out of channel spectrum is higher than that of the modulator input signal, Figs 5 & 7? Nonlinearities in linear high power amplifiers generate these IMD spurious signals (noise) which land outside of the desired 6 MHz channel band edges. For DVB-T transmitters, Fisher [1], on pages 446-448 states that they have found that acceptable performance for commercial broadcast DVB-T transmitters, without degrading the S/N of the digital signal is obtained by driving the final amplifier until the out of channel spectrum shoulder break-point reaches -28 dB below the in channel power level. Then for their R&S transmitters, they then add digital pre-distortion as equalization. This buys them another 10 dB, driving the shoulder down to -38 dB. Then the output of the final power amplifier is passed through a channel mask, band-pass filter which drops the shoulder even further to -52 dB, thus meeting govt. regulations.

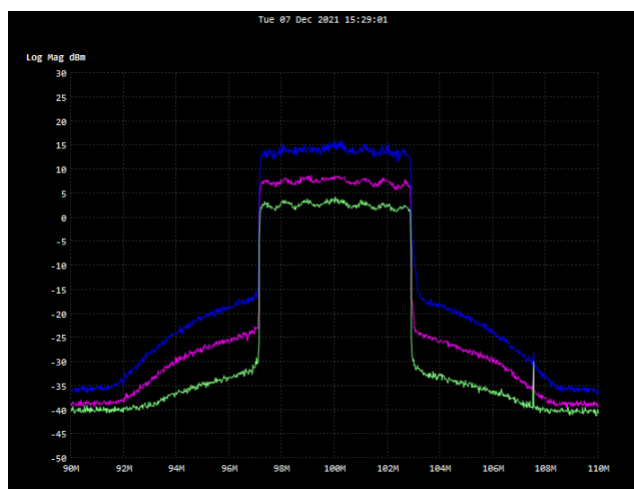


Fig. 10 TinySA measurement of a KH6HTV Video model 70-7B Amplifier. Center frequency is 435 MHz. 5dB/div & 2MHz/div. The amplifier's output was adjusted from High to Medium to Low in -5dB steps. Blue trace is +35dBm, magenta trace is +30dBm and green trace is +26dBm.

For our ham radio, DVB-T transmitters, I have found that a good compromise trade-off between maximizing the RF output power and minimizing degrading the S/N quality of the transmitted DVB-T signal is to run the drive power up until the shoulder break-point reaches -30 dB. At this point, I achieve a Crest Factor of about 8 to 10 dB. This means the average DTV power is -8 to -10 dB below the max. saturated power rating of the amplifier. This crest factor is required to avoid clipping the peaks in the DTV signal and thus destroying its S/N. Most DATV hams are thus content to use their transmitters, as is, radiating signals that look like Fig. 10. We typically do not have, nor can afford the cost of an exotic digital pre-distortion equalizer. For DATV repeater service however, the addition of a sharp cut-off, steep skirted, 6 MHz band-pass channel filter is absolutely required.

For additional reading on testing DTV transmitters, I recommend checking out the premier, German supplier of broadcast TV transmitters, Rohde & Schwarz's web site. www.rohde-schwarz.com They have a large collection of relevant application notes and newsletters there.

References

1. "Digital Video and Audio Broadcasting Technology", by Rhode & Schwarz engineer, Walter Fisher. Published by Springer-Verlag, Berlin, Germany, 2010. See chapter 21, "Measuring DVB-T Signals", pp. 421-450
2. "Digital TV Rigs and Recipes -- Part 4, DVB-T", S. Grunwaki, Rohde & Schwarz, Broadcasting Division, Application Note DigitalTV4, version 3.0, 13 Aug. 2002, 66 pages --- available as .pdf files to be downloaded from: https://www.rohde-schwarz.com/us/applications/digital-tv-rigs-and-recipes-application-note_56280-15676.html

~ Jim KH6HTV



More Ham

SARC-SEPAR 2021 ARRL Field Day Results

Almost 27,000 participants joined in the fun during Field Day this year, making over 1.4 million contacts. According to the ARRL, Similar to last year, the 2021 ARRL Field Day was unique because of the COVID-19 pandemic restrictions on gathering. Groups and individuals around the US, Canada, and 13 DX entities successfully demonstrated how they were able to adapt their pre-pandemic Field Day strategies to participate in this year's event.

The two temporary rule waivers that were issued last year due to the pandemic were extended into 2021, allowing Class D (home) stations to count their contacts with other Class D stations for points (standard Field Day rules don't count Class D-to-Class D contacts toward the total score). Additionally, Class D and E stations were limited to 150 W output power for this year. As with last year, all entrants, regardless of their entry class, were able to apply their individual scores to their club's aggregate score.

Because many areas of the US loosened their restrictions on gatherings in public spaces, there was an increase in the number of Class A (groups of three or more) participants compared to last year, comprising almost 18% of the total number of entries for this year's event. The Class D (home stations, commercial power) category had the largest number of entrants, followed by Class E (home stations, emergency power). Class D and E stations comprised roughly 67% of the total entries for the 2021 Field Day event.

The SARC-SEPAR Field Day 2021 team came in 45th overall in class 1D. Our effort was based on separated stations using the VE7SAR callsign.

Radio amateurs plan WiFi for disaster areas

The German radio amateurs who have joined forces in the non-profit German Amateur Radio Club (DARC) have developed a new emergency radio concept.

During the flood disaster in the Ahr valley, they hardly got a chance, because the rescue workers have a powerful communication infrastructure with the new digital radio for authorities and the radio bridges that amateurs could build can hardly be integrated.

According to its own information, the Emergency and Disaster Radio Department at DARC has been analyzing for a long time how the requirements for emergency radio have changed as a result of technical change. The association has now presented a completely new concept in which external helpers from aid organizations, politics, business and the armed forces have contributed.

In the future, German radio amateurs in disaster areas will no longer just record and forward messages as before, but rather set up high-performance WiFi networks that allow those affected to access the Internet and send messages and retrieve information themselves via smartphone or notebook.

See <https://marketresearchtelecast.com/radio-amateurs-plan-wifi-for-disaster-areas/233625/>

Strata ban upheld

The BC Supreme Court upheld a strata ban on an 11-metre antenna, but, from a legal point of view, it could have served other bands as well... It's an interesting case as the antenna was hidden inside a flagpole and the strata bylaws only prohibited satellite dishes.

See <https://www.nsnews.com/bc-news/court-upholds-strata-ban-of-11-metre-radio-antenna-4543779>

~

2meters

Bob Witte K0NR

Working Phone Sweepstakes

Bob maintains a great blog site at <https://www.k0nr.com/worldpress/>.

Contact Bob at bob@k0nr.com.

You can also check out his book [*VHF, Summits and More: Having Fun With Ham Radio*](#).

This is a report on my single-operator contest effort during the [ARRL November Sweepstakes](#) (Phone) HF Contest. Some other potential titles for this article are:

- A Slacker's Guide to Working the Sweepstakes
- How To Almost Work 50 States On a Weekend
- A Simple Way to Get On the HF Bands

Contests on the HF bands can be a fun way to make a lot of contacts and get some new states or countries. The ARRL Sweepstakes promotes contacts between US and Canadian stations, so it is an opportunity to work those states and provinces.

The Club Challenge

I don't usually work the Sweepstakes contest but Bill/K0UK put out a challenge to the [Grand Mesa Contesters](#) club to get on the air and contribute whatever points you can to the aggregate club score. I thought this was a good idea and decided to join in

the effort. I already had committed to teaching a General License class on Saturday, so that limited my operating window to mostly Sunday. No problem, I could still make a significant number of contacts on Sunday.

I read the [rules for the contest](#) to make sure I knew the operating times, entry categories, what stations I could work for points, and the contest exchange. Sweepstakes has a complicated contest exchange, that includes a serial number (every contact gets a unique sequential number), precedence (operating class), your callsign, the last two digits of the year you were first licensed, and your ARRL section. Wow. For me, the section is just Colorado (abbreviated CO), but some states have multiple sections. It is a great idea to have the list of [ARRL and RAC \(Radio Amateurs of Canada\)](#) sections available. So the information I gave to the other station was something like this: 105 A K0NR 77 CO. In the example, 105 is the serial number that incremented with each radio contact.



The Yaesu FT-950 is a capable 100-watt transceiver for HF and 6 meters.

Antenna Project

It turned out that my HF antenna at the house fell down some time ago because the rope holding the wire had rotted away. So my first task was to do a quick but effective antenna installation. We have a 30-foot Ponderosa pine in the backyard, which is my preferred antenna support. I have a number of wire antennas stashed away in my basement, including dipoles, end-fed halfwaves, G5RV's, etc.

For this contest, I decided to use an end-fed antenna from MyAntennas.com, about 44 feet long. This antenna has a 9:1 matching transformer (an "unun") that matches the high-impedance of the wire to something closer to 50 ohms. An antenna tuner is required to do the final matchup over multiple HF bands. This antenna is long enough to be effective on 40 meters and any higher band, which matches my usual operating habits. I had a Yaesu FT-950 transceiver available which has an internal tuner that was able to match the antenna on 40m, 20m, 15m, and 10m. This is *not* an end-fed halfwave... it is a "random" length of wire that is not resonant on any ham band but will radiate pretty well using the matching transformer. The advantage of this antenna is its simplicity and ability to handle multiple bands, with the push of the internal antenna tuner.

My main challenge was to get this antenna up into my favorite Ponderosa pine tree. Again, I took a simple approach. I grabbed my spin-cast fishing pole, attached two 5/16-inch hex nuts to the end of the line (to act as a weight), and cast the nuts up over the top of the tree. This

may sound difficult, but it only took me three casts to get the fishing line on a limb that I liked. I let the line out and let the weight drop to the ground. Then I attached a 1/8-inch synthetic rope onto the fishing line and pulled it back up over the tree. Soon, I had my antenna support rope passing over the very top of the tree. It was a simple matter to attach and hoist the undriven end of the antenna to the top of the tree. The antenna is longer than the height of the tree, so I sloped the antenna away from the tree.

A length of RG-8 style coax connected the antenna and the transceiver in the ham shack. I did not ground the antenna transformer or add a counterpoise, hoping that the length of coax would be sufficient to act as a counterpoise. This worked out OK and the FT-950 was able to drive the antenna using just the internal antenna tuner on all bands.

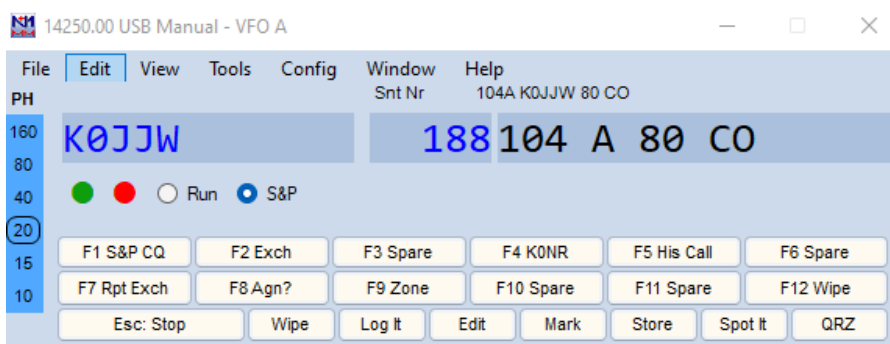
Station Setup

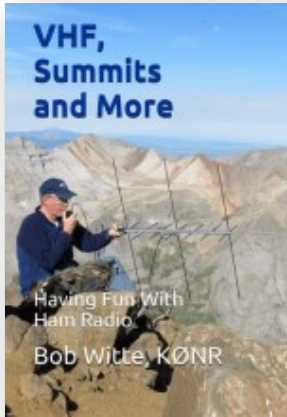
You don't have to have a computer to log your contacts during the contest, but you really should. Even with 50 contacts written on paper, it becomes difficult to remember which stations you've already worked. Also, the logging program automatically



An example of a MyAntenna end-fed long wire (EFLW) antenna with 9:1 matching

The N1MM entry window shows the serial number of the current QSO plus the contest exchange from the other station.





This book is an easy-to-understand introduction to VHF/UHF ham radio, including practical tips for getting on the air and having fun messing around with radios. Learn about FM, SSB, repeaters, equipment, band plans, phonetics, portable operating, Summits On The Air (SOTA) activations and more.

generates the serial number mentioned above. Very helpful.

For most contests, I use the N1MM Logger+ software, which is arguably the standard in ham radio contest loggers. It is free to use and is available here. I probably use about 10% of the power of this software but it is relatively easy to use, once you get familiar with it. It has templates for all of the contests, so it keeps track of your score and warns you if you've already worked a station. It automatically generates the cabrillo format for submitting your log electronically.

Results

With a 100-watt-and-a-wire station, you have to compete with much more capable stations during a contest. These folks may be running 1kW and gain antennas. I used the "search and pounce" technique, tuning around to find strong stations calling CQ. I typed the callsign into the logging program to make sure we have not already worked and then I called them, just saying my callsign. If they hear me, they will call me back, providing their exchange information. I enter that into N1MM and give them my info. It is as simple as that.

I can usually judge how well my station is doing by how quickly I can contact another station. If they answer me on the first call, that's great. If it takes a few calls, it usually means that someone else is beating me out in the pileup. I was happy with the performance of the station — I was making contacts at a decent rate.

I made 187 QSOs in about 7 hours of operating, which works out to one contact every 2.5 minutes or so. That rate is not going to win the contest but it was good enough to keep me having fun.

The scoring multiplier for the contest is ARRL and RAC sections, with a maximum number of 84 sections. I worked 66 of them, so not too bad but not a clean sweep. I worked 45 of the 50 US states, missing South Dakota, Oklahoma, New Mexico, Utah, and Alaska. Except for Alaska, the missing states are relatively close to Colorado, so a little more time on 40m (or 80m), for shorter skip distance, would probably have gotten them. The point is that you can achieve [Worked All States](#) (WAS) on a single Sweepstakes weekend.

This is a good example of how to get an HF station up and running and make some radio contacts. I often encounter hams that are new to HF and not quite sure how to get on the air. It does not have to be complicated...get a basic transceiver, power supply, coax and a wire antenna and give it a try. Doing this on a contest weekend means that you'll have plenty of stations to contact.

~ Bob KØNR

Band	QSOs	Pts	Sec	Pt/Q
7	55	110	23	2.0
14	113	226	37	2.0
21	19	38	6	2.0
Total	187	374	66	2.0
Score: 24,684				

...more 2meters

Bob Witte KONR

What Is a Valid QSO?

Ham operators make radio contacts on a routine basis. We call another station or another station responds to our call, we exchange some information, maybe chat for a while and then finish the contact, clearing out with our callsigns. Most of the time we clearly know whether we had a valid radio contact, commonly referred to as a QSO.

Sometimes it is not so clear. I hear a DX station calling CQ... I call him (giving his callsign and my callsign) and I hear him say "your report is 5 and 9" so I say "QSL and 73" and put him in the log. Did I really work him? Maybe not. Did he hear my callsign correctly? Was he even talking to me? Not sure.

The question of what constitutes a valid radio contact has been asked for decades. Edward Tilton W1HDQ in the "The World Above 50 Mc" column, QST Magazine, March 1957 wrote this:

As amateurs we are presumed to be engaged in communication. This implies exchange of information, not just identification of one another. Thus, a reasonable definition of a QSO, for amateur purposes, would seem to be an exchange of useful information. Otherwise, why communicate at all?

Tilton goes on to say:

The minimum exchange for two-way work to be considered a contact has been fairly well standardized on a two-stage procedure: positive identification of calls at both ends, and the complete exchange of signal reports.

The latter is about the shortest item of information that can be transmitted between two stations that will have any meaning at all. The form varies with various operating activities, but the basic idea of mutual exchange remains in all.

Actually, the exchange of signal reports may be replaced by some other "exchange of information." For example, during VHF contests the standard exchange of information is usually the 4-character grid locator. Signal reports are not usually given.

The IARU Three Steps

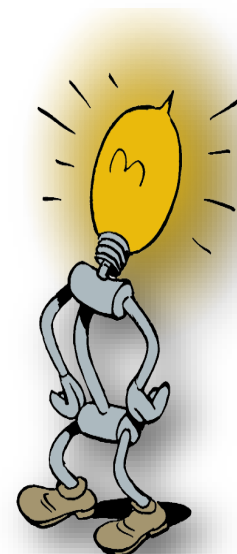
The International Amateur Radio Union (IARU) in their HF Manager's Handbook and VHF Manager's Handbook says:

A definition for a valid QSO is:

A valid contact is one where both operators during the contact have

1. mutually identified each other
2. received a report, and
3. received a confirmation of the successful identification and the reception of the report.

It is emphasized that the responsibility always lies with the operator for the integrity of the contact.



Let's take a practical look at the IARU definition and what it means:

1. mutually identified each other

You exchange callsigns with the other station (making sure you have them correct). This tends to happen naturally as part of the calling process in amateur radio.

2. received a report

You exchange a signal report or some other information (grid locator, contest exchange, ...)

3. received a confirmation of the successful identification and the reception of the report.

You acknowledge that you have the information from 1 and 2, by saying "QSL", "Thank you" or something similar.

Some Scenarios

The rigor applied to making a contact does vary depending on the specific situation. Here are a few specific examples that will help explain this.

FT8

The WSJT-X software used for making FT8 contacts has IARU Steps 1, 2, and 3 embedded into its communication protocol. FT8 is intended to work well under weak-signal conditions, so the software implements a rigorous use of information exchange. Appropriate use of this software guarantees a valid QSO.

These are the FT8 messages for KØNR working W1AW.

The QSO starts with one station calling another (callsigns are exchanged). The standard FT8 messages (see figure) show that KØNR calls W1AW with grid locator included (TX1). Typically, W1AW would

respond by calling KØNR and providing a signal report. (Signal reports are in decibels, just a number.) KØNR responds with TX3, which does two things: sends "R" to indicate that the signal report from W1AW was received AND sends the signal report of -15 dB to W1AW. When W1AW receives that transmission, it knows that callsigns and signal reports have been exchanged and sends RR73 to complete the QSO. KØNR may respond with a 73 message, but that is not required for a valid QSO.

Generate Std Msgs	Next	Now
W1AW KØNR DM78	☒	Tx 1
W1AW KØNR -15	☐	Tx 2
W1AW KØNR R-15	☐	Tx 3
W1AW KØNR RR73	☐	Tx 4
W1AW KØNR 73	☐	Tx 5
CQ KØNR DM78	☐	Tx 6

These are the FT8 messages for KØNR working W1AW.

I realize that if you haven't worked FT8, this may be confusing. If so, just note that the design of the WSJT-X software leads the user through these specific messages to ensure that the three IARU steps happen.

VHF Contest QSO With Weak Signals

Radio contacts during VHF contests can be a bit casual: one operator calls another (callsigns exchanged) and they tell each other their grid locators. IARU Step 3 (the QSL or acknowledgment) may be assumed or perhaps one of the operators just says

thanks or 73 to indicate the contact is complete and they are signing clear. But when the signals are weak, VHF operators tend to be more careful about making sure they made the contact.

Here's a weak-signal CW QSO between KØNR and W9RM:

KØNR calls W9RM

KØNR: W9RM W9RM W9RM de KØNR KØNR KØNR

W9RM responds and sends his grid (DM58)

W9RM: KØNR KØNR de W9RM DM58 DM58 DM58 BK

KØNR responds with multiple "R"s to indicate that the grid was received and sends his grid (DM78)

KØNR: R R R DM78 DM78 DM78 BK

W9RM responds with multiple "QSL"s to acknowledge that the information is complete

W9RM: QSL QSL QSL de W9RM BK

KØNR would probably reply with "73 73 73" but that is not necessary for a valid QSO

HF Contests

HF contests are fast and furious, with a high value placed on quickly making contacts. Thus, they tend to use the bare minimum to complete a QSO. Let's take the example of a Big Gun station making multiple contacts in succession, otherwise known as "running." Here, ZF1A is working the CQ Worldwide DX Contest with a number of stations calling him. He initiates the radio contact with "QRZ?"

ZF1A calls QRZ?

ZF1A: ZF1A QRZ?

KØNR calls ZF1A by just saying his callsign

KØNR: Kilo Zero November Romeo

ZF1A calls KØNR and gives the contest exchange: signal report (always 59 in a contest) and CQ Zone (08 in this example)

ZF1A: KØNR 59 08

KØNR responds with a "Roger" to indicate the information was received and provides a signal report and CQ Zone 04

KØNR: Roger 59 04

ZF1A acknowledges the information and calls for the next station

ZF1A: Thank you, ZF1A QRZ?

This is a fast and tight exchange. Note that to save time, KØNR did not say ZF1A's callsign during the contact. It does have the potential of a broken QSO if the operators are not paying close attention. KØNR must be sure he is hearing ZF1A's callsign correctly and that ZF1A sent KØNR's callsign correctly. Similarly, ZF1A will make sure he has KØNR's callsign and exchange before moving on. If ZF1A is not sure of KØNR's callsign and exchange, he will ask for a repeat. Sometimes the running station just calls QRZ? to complete the contact so IARU step 3 is implied. (If ZF1A did not have confidence that the QSO was complete, he would have asked for a repeat.)

Parks On The Air (POTA)

From the POTA rules: "POTA does not require a formal exchange, though many activators will wish to receive real signal reports, names and locations." My experience is that the park Activator usually sends a (real) signal report and the park number (e.g., K-4404). The Hunter usually sends a real signal report and state. Something like this:

KØNR calls CQ POTA

*KØNR: CQ CQ Parks on the air Kilo Zero
November Romeo*

KØJJW answers him

*KØJJW: KØNR this is KØJJW Kilo Zero Juliet
Juliet Whiskey*

*KØNR responds with the signal report and park
number*

KØNR: KØJJW you are 57 in park K-4404

*KØJJW acknowledges the information and
provides a signal report and state.*

*KØJJW: Roger. You are 5 6 into Colorado.
Thanks for the activation.*

*KØNR confirms that the QSO is complete and
moves on to the next station*

*KØNR: QSL and thank you, this is Kilo Zero
November Romeo, Parks On The Air*

When conditions are marginal, a POTA QSO will naturally tend to have signal reports and QSL messages sent multiple times to make sure that the information gets through.

Summits On The Air (SOTA)

The general SOTA rules state “QSOs must comprise an exchange of callsigns and signal reports, it is strongly recommended that the summit identifier be given during each contact.” SOTA contacts are similar to POTA contacts in terms of format, except the summit number (e.g., W0C/FR-004) is exchanged instead of the park number.

Time Constraints

Meteor scatter (MS) is an interesting case, mostly because it can take a long time to complete the QSO. The two stations are transmitting to each other on alternating time windows hoping that a meteor will streak by and leave an ionizing trail so that a radio contact can be made. It is common for an MS QSO to take 30 minutes or longer.

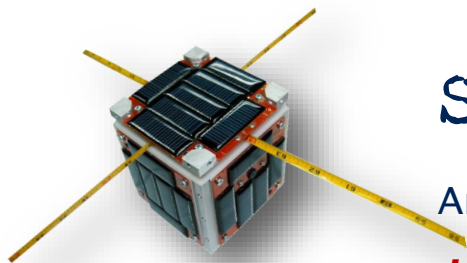
The message sequence is similar to the FT8 example, so I won't repeat it here. Imagine sitting in front of your computer patiently waiting for the right meteor burst to occur so that 1) callsigns are exchanged 2) signal reports are exchanged and 3) a final acknowledgment occurs. This raises the question of how long is too long to count as a valid QSO? I don't know of a specific standard but most people would agree that if the three steps occur over several days, it is probably not a valid QSO. It seems like most hams working MS complete their contacts within a few hours, typically less.

One more question: what information do you need to record concerning the QSO? This will also vary depending on the circumstances, but most hams log callsign, signal reports, time (UTC), frequency or band, and mode. Note that Logbook of The World does not store signal reports but does require and store the time of the QSO, along with the band and mode. Another example: when submitting a contest log, the context exchange from both stations must be included (and these are checked against other submitted logs). The point is you need to be thinking about how the QSO information is going to be used and recorded. [Thanks, Bob/WØBV]

Summary

The three steps in the IARU definition of a valid QSO can be summarized as: 1) exchange callsigns 2) exchange signal report or other information and 3) confirm that #1 and #2 happened. This still leaves some gray area when it comes to deciding whether a QSO was valid or not. Most of us have had that funny feeling at the end of a marginal contact: should I put this in the log or not? This is where the final IARU advice applies: *The responsibility always lies with the operator for the integrity of the contact.*

~ Bob KØNR



Satellite News

Amateur radio monitoring requested

Japanese lunar lander puts amateur transmitter on the moon

Japan's **OMOTENASHI**, the world's smallest lunar lander, will be equipped with an X-band (10GHz) and UHF (70cm) communication system. It does not get (unfortunately for us) a transponder.

OMOTENASHI (the name is an acronym for 'Outstanding Moon Exploration Technologies demonstrated by Nano Semi-Hard Impactor') is a 6U CubeSat launched in February 2022 via a NASA SLS rocket. Omotenashi is also a Japanese word for "welcome" or "Hospitality". The OMOTENASHI orbiter and lander were designed by the Japan Aerospace Exploration Agency (JAXA). It is a 6U CubeSat measuring 10 cm × 20 cm × 30 cm, and has a mass of 14 kg (31 lb). The principal investigator is Tatsuaki Hashimoto from JAXA. The spacecraft features two deployable solar panels and lithium ion batteries. After measuring the radiation environment as it approaches the Moon, OMOTENASHI's lander module will perform a semi-hard landing on the lunar surface.

OMOTENASHI uses a cold gas thruster to enter a lunar-impact orbit, and a solid rocket motor for the landing phase. The entry and landing phases will be informed by the use of an [X-band](#) two-way Doppler. The orbiting module will enter at a shallow flight-path angle of $\leq 7^\circ$, and it will be ejected when the solid rocket burn begins the deceleration maneuver. The rocket will be ignited with a laser. After the deceleration rocket burn that will last 15-20 seconds, OMOTENASHI's lander will eject the retrorocket, experiencing a free-fall of about 100 m. Just before impact, the lander will deploy a single airbag about 50 cm in diameter to minimize the impact, estimated to be at 20 - 30 m/s.

The spacecraft consists of two separable components, both with independent communication systems: an Earth-orbiting module and a surface probe. The module orbiting the Earth will carry the surface probe to the moon. It will transmit beacon or digital telemetry data at UHF (437.31 MHz) with PSK31. The surface probe (the lunar lander) will emit digital telemetry or three-axis acceleration analog wave at UHF (437.41 MHz) in FM, PSK31 and PCM-PSK/PM. The transmitter may in both cases is 1 Watt.

Radio amateurs can play a role in collecting data from the surface probe, which can account for things like acceleration data about its impact on the moon. "There is an up- and downlink station in Wakayama (Japan) that is used as an EME station [moon bounce]. However, if the satellite is invisible from Japan, we will not be able to receive the downlink signal. So we need a lot of help from ham radio stations around the world." according to [Wataru Torii](#) of the Japan Aerospace Exploration Agency (JAXA) Ham Radio club JQ1ZVI.

The orbiting module beacon will transmit on 437.31 MHz using PSK31. The surface probe beacon will transmit on 437.41 MHz using FM, PSK31, and PCM-PSK/PM.

~ AMSAT

NASA Space
Launch System
(SLS) rocket



SOLDER SPLATTER

John Schouten VE7TI

The Christmas kit

I got my start in electronics fairly early... I was about 12 years old when I received a very basic shortwave radio kit for Christmas. I built it, and I've been hooked ever since.

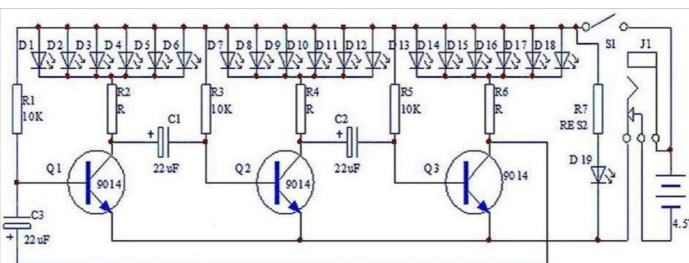
Two of our grandkids are girls age 5 and 7. They frequently fascinate me with their knowledge of the world and, in particular, science. They've shown interest when I've been on the radio, and have eagerly participated in our fox hunts. A few months ago, while looking on Amazon for an electronics module for a project, I came across an inexpensive kit to build a 3-D Christmas tree lit by flashing LEDs. At C\$7 each, the parts were worth more than the entire kit, so I bought two.

It occurred to me that they would be appreciated by the girls for room decorations at Christmas. The first

weekend of December the girls were scheduled for a sleepover, and it seemed the perfect opportunity to build the kits.

There was a picture in the bag and it created some excitement. Both of them wanted to build. I got our some basic tools... my soldering station, sidecutters a pair of needlenose pliers; and we settled around our kitchen island.

It was the youngest one's turn first, helping to separate and sort the parts was interesting for her. Having taken inventory I found two initial issues. I was short a transistor and the resistor values did not match those in the on-line schematic... Oh, I forgot to mention there were no instructions. Although the circuit board was well manufactured, and the parts were printed on the board, nowhere was there mention of which value resistor went in which location. The only value in the schematic was 10K, but there were no 10K resistors in the kit. I determined that



The kit and the circuit. Despite some shortcomings, I don't think I could buy the parts for \$7

I had 100 Ohm and 4.7K resistors, six of one and seven of the other. There were two boards meant to slide into one another to make the tree. I determined that there were three resistors connected to the base of each transistor, and three connected between the collectors and banks of LEDs on each board. That left one resistor in series with the remaining LED. Rather than disappoint the kids, and having done the math, I decided to go ahead and assign the resistors into what I thought would be the appropriate location.

I explained to the older one the need to observe polarity with the capacitors and LEDs. She figured our transistor placement herself by the outline pictured on the board. I also showed her how to stand the transistors slightly above the board and “standing proud” is now part of her vocabulary.

Parts placement was an enjoyable task for each. I showed them how to bend the leads so the resistors and capacitors sat flat on the boards. Soldering came next, a skill neither had ever attempted before and one that caused their grandmother and myself the most concern. Would they burn themselves? Fortunately that never happened or they would have abandoned the project and likely ended a promising future career opportunity.

The younger of the two had to be guided carefully to apply just the right amount of heat and solder. The other was shown and then insisted she could handle it herself. I watched in amazement as she picked up the iron, carefully scrubbed the tip, as she had seen me do, and then place it on the component lead at the board to apply heat and solder. The first few times I said: “OK” when it was time to move to the next point but she quickly figured it out and completed more than half of the connections entirely on her own, solder in one hand and iron in the other.

Next came the trimming. Again I showed her how to trim the leads close to the board, then she took over and finished the job.

They each chose the pattern of colored red, green and yellow LEDs. When each board was finished we tested it before moving on. Two of the four boards did not work initially. Fearing I had, after all, miscalculated to resistor placement I did some troubleshooting. It turned out that a trace from one LED on each board went nowhere! From the circuit diagram I was able to figure out the missing connection and a short jumper saved the day.



Our first joint foray into electronics...

Top: the finished tree as pictured on Amazon.

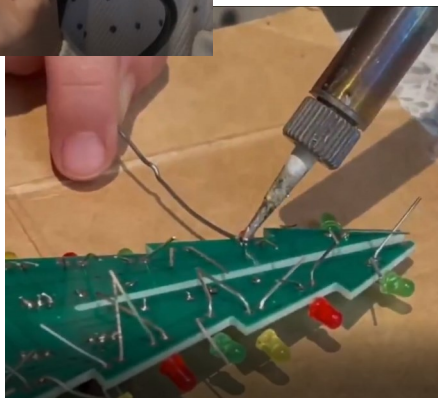
Below [L>R] First came sorting parts; the younger of the two, age 5, trimming component leads; and an assisted soldering lesson.





Two proud and happy kids went home that day, and I too felt that it was a success beyond my expectations. Don't underestimate the capabilities of these youngsters... they are far more skilled than my, or even my kids' generation at that age.

~ John VE7TI



Above: Amazing to watch... at age 7, soldering entirely unassisted. Trimming leads, the finished product, and the instructor and his happy and proud students.

Introducing the Icom ST-4002A GPS tool for Android OS Devices

In addition to our news announcing time adjustment software for selected Icom Amateur radios, Icom has also announced a new GPS tool for Android OS devices called the ST-4002A.

The ST-4002A is available to download for free from both the Icom website and GooglePlay. It will automatically allow you to input GPS location data from an Android™ device to your transceiver.

The software is compatible with:

- IC-7100

- IC-9100
- IC-9700
- ID-4100A/E
- ID-5100A/E

For more information and to download the software/app, please visit:

[ST-4002A GPS tool Download Page.](#)
[ST-4002A GPS tool Download from GooglePlay.](#)

~ Southgate Amateur Radio News

Google Play link



...more

SOLDER SPLATTER

Norm Freidin VE3CZI

Heath HW-16 Modifications

I purchased this Heath HW-16 USED from a chap who was a fellow Tech and liked to modify equipment. He passed away and the HW-16 was stored in a dry basement for 10 Years.

I received this unit and from initial inspection, was in good condition without any rust or corrosion.

Although I received the original Manual, I did not receive any documentation on the many modifications he had made, so I spend about 3 weeks, tracing out and making schematics on how the mods were wired into the existing circuitry.

After all the work, the unit powered up OK. Receiver had good “On The Air” Sensitivity compared to my Kenwood TS-590S with nice Audio. The Transmitter had very LOW Output. Checked for Filament Glow on the tubes, and found the 6GE5 Final had NO Glow. Filament Continuity checked OK, and after tracing the wiring, found the Filament 6.3 VAC had been routed to a switch on the front panel, I suppose to conserve Filament and prolong the tube’s life. The Transmitter now had 40 Watts Output on 40M and 80M with slightly less on 15M with nice CW Signal on my Kenwood Receiver.

Note that controls were relocated to accommodate modifications.



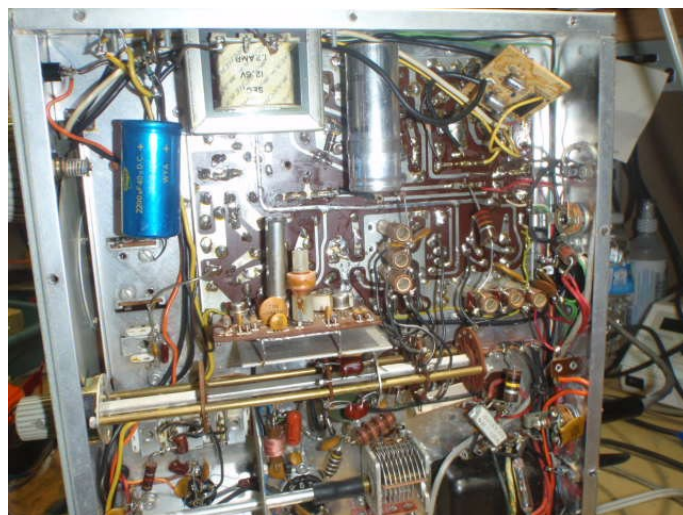
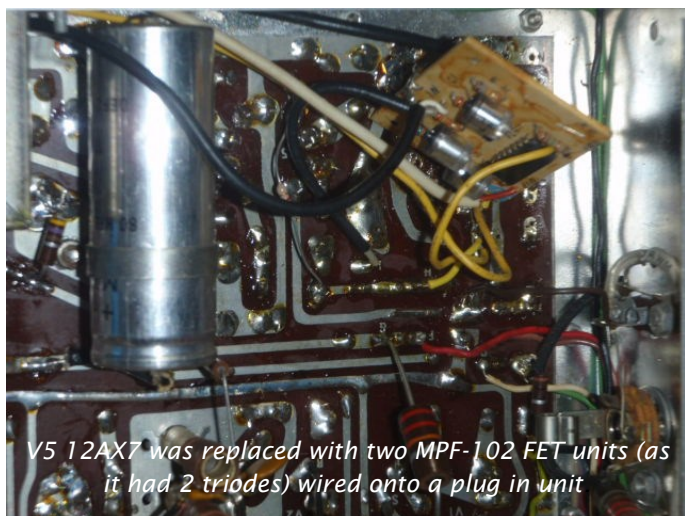
I am submitting this modified HW-16 to show what other changes could be made to this versatile CW Rig, Can not wait until SKN at the End of the Year... or maybe before!!

Modifications that were made:

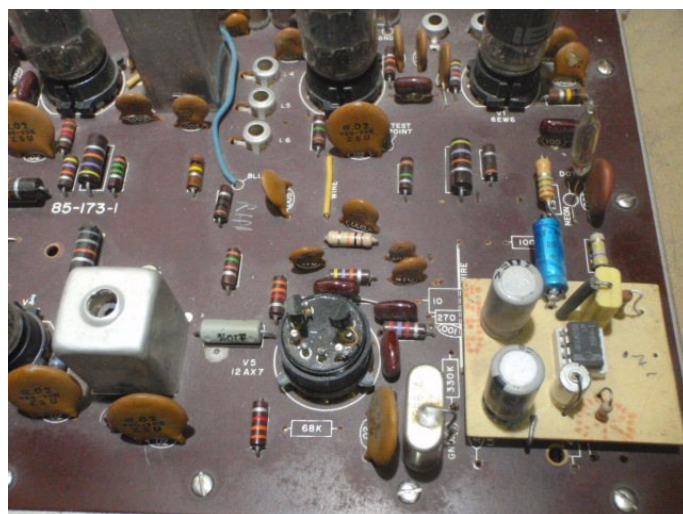
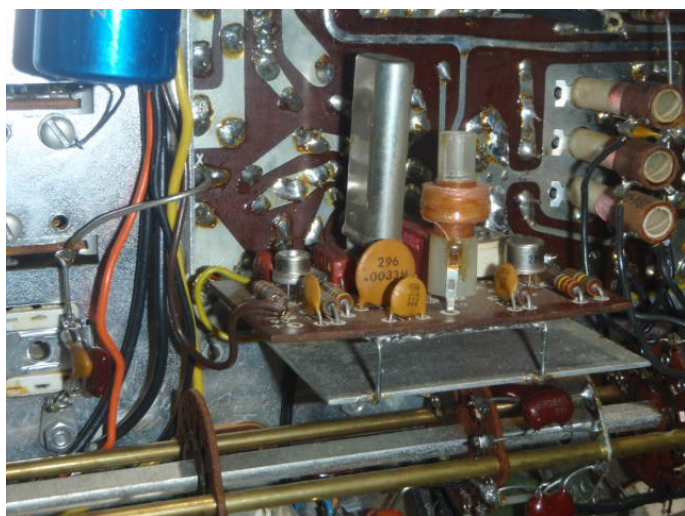


100 Khz Osc Selectable on Front Panel with Push Switch

A Push Button on Front Panel turned 6.3 VAC ON/OFF to the rear Octal Plug to control the HG-10B VFO



Switch to turn 6GE5 Filament ON/OFF



V6 6HF8 was replaced with an LM-380 Solid State Amplifier.

~ Norm Freidin VE3CZI

By way of background, the Heathkit Model HW-16 CW Transceiver is a high performance and economical amateur radio receiver and transmitter. Although it is designed with the Novice Class operator in mind, this Transceiver is also an excellent piece of equipment for the General Class operator. The Transceiver provides full break-in CW communications in the lower 250 kHz segments of the 80-, 40-, and 15-meter bands.

The transmitter is crystal-controlled, using 80-meter crystals on 80- or 40-meter bands, and 40-meter crystals on 40- or 15-meter bands. The Transceiver also has provisions for an external VFO. Input power to the final stage is adjustable for 50 to 90 watts input. A 75 watt marker on the meter, which indicates plate current, represents maximum power for Novice Class operation.

All three stages of the transmitter are grid-block keyed. The only tuning required when changing bands or frequency is adjusting the final Tune capacitor.

The receiver uses dual conversion for excellent image rejection and the receiver's front end is crystal controlled for excellent stability. For high selectivity, the receiver uses a 500 Hz crystal filter. The receiver is automatically muted each time the key is depressed, providing full break-in operation. No external antenna relay is required, as antenna switching is accomplished within the Transceiver.

~

I am summing up this year 2021 as MFJ Ambassador for Europe and Italy. It was short because I was honored with this prestigious task only in August, so I was able to plan and implement only a few initiatives.

My main purpose is to give greater visibility in Europe and Italy to a prestigious brand that does not need me to make itself known on the market, but only to better retain its customers by making them feel more involved and considered.

An activity that has borne its positive results and that MFJ will certainly continue, was the collaboration with the ARRL Volunteers in Italy led by Vinicio IK2CIO.

The idea developed together with Vinicio was to give a virtual gift card worth US\$ 25 to anyone who passed the exams for the American license with the highest or best score. It was a partnership of American realities on Italian soil!

Vinicio IK2CIO organizes its driving license sessions at the major Radiomator Fairs in Italy, and so it was for the Scandiano Fair on 13 November, the Pordenone Fair on 20 November and the Pescara Fair on 27 November.

We therefore had in order three winners from different parts of Italy, such as IK2CNC Carlo, IW3HVB Giulio and IU0AHC Fabrizio.

We will try to replicate this initiative in other parts of Europe, but we will certainly continue on this path with my friend Vinicio IK2CIO whom I want to thank for his enthusiasm in accepting my proposal.

Please remember the Official MFJ Telegram Channel //t.me/mfjenterprises and I want to take this opportunity to thank Madiaglobe, as an MFJ reseller, for highlighting the Telegram Channel through its social networks.

P.S. We are open to do the same in all Europe! Just write to ambassador@mfjenterprises.com

MFJ in Europe





Ham Hardware

Al Duncan VE3RRD

Modify the MFJ-1919EX Mast for use with the Buddipole



*From the Barrie (ON) Amateur Radio Club
[Barrie Amateur Radio Club - Home](http://barrieamateurradioclub.com)
(barrieamateurradioclub.com)*

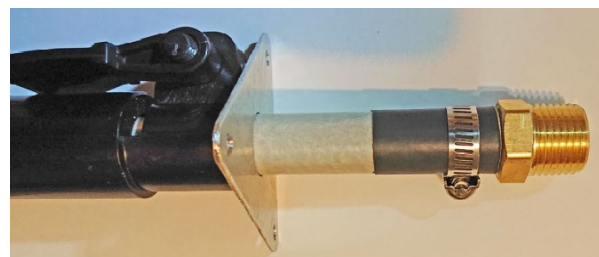
I recently acquired an almost new MFJ-1919EX heavy duty tripod with fibreglass telescoping mast that extends to 18 feet. The top section tube is 3/4 inch outside diameter with a 1/2 inch inside diameter, but the only way I could see to mount an antenna to it was with clamps, which wouldn't work very well for the Buddipole.

The solution was a 1/2 inch insert to 1/2 inch male pipe thread brass hose connector. The one I found at Home Hardware (D125-8D-BRASS, Home Hardware #8690179) would extend down into the top fibreglass section far enough for strength and screwed into the Buddipole VersaTee securely. I had to file the ridges slightly so that it would fit snugly so it can't turn, but not too tightly into the mast top section as it could crack the fibreglass.

Guy ropes/cords will be required when using this fully extended outdoors. A triangular piece of heavy plastic or a piece of aluminum with a 3/4 inch hole in the centre and smaller holes in each corner can be used. I hack-sawed out a triangular piece of 1/16 inch thick aluminum about 3-1/4 inches on a side for my guy attachment plate. The top mast section can be removed and the guying plate slipped over the bottom end.

I added a small hose clamp to help prevent damage to the fibreglass from the torque produced on a windy day. The top end of the tube was filled with a hard glue-like substance so I flipped it over and used the other end for the adapter. I drilled a hole through the glue to allow moisture to drain, but I will be sealing the hole in the 1/2 inch brass adapter.

Raising the Buddipole up to double the standard 9 foot height definitely improves its performance when using it with my KX3.



[Left] The top mast section and 1/2 inch to 1/2 inch adapter, and [Right] Finished installation with heat-shrink and hose clamp added, also showing my aluminum guy attachment plate.

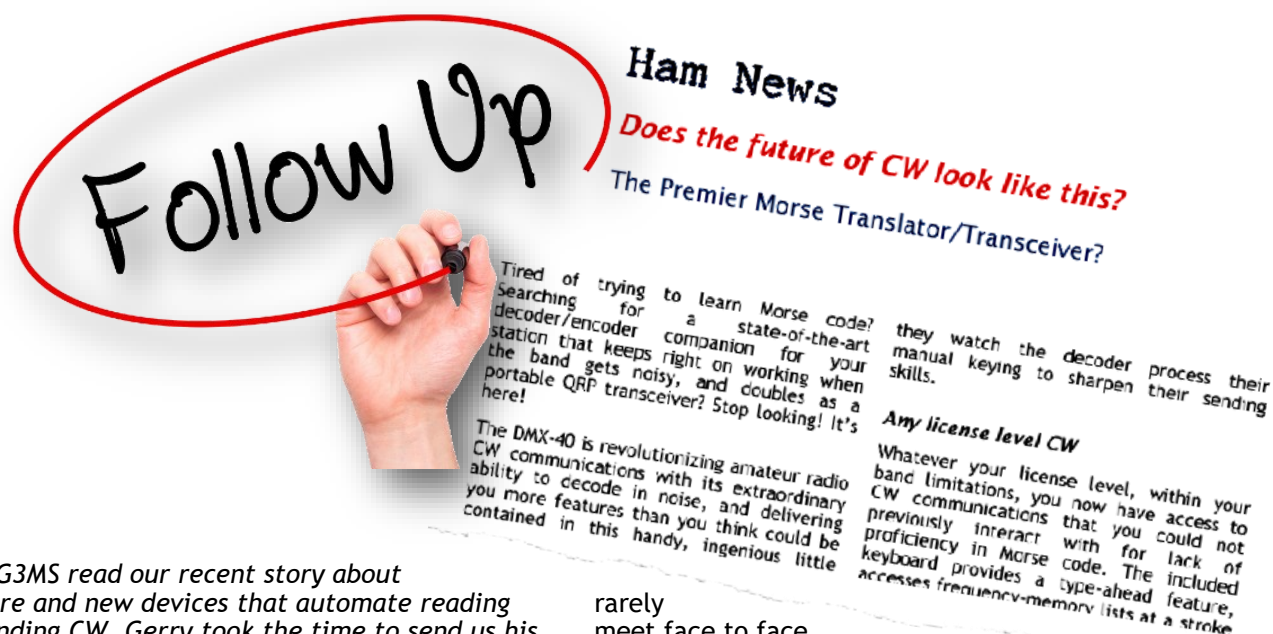


I also have the long telescopic whips and an extra 22 inch antenna arm for each side plus the TRSB to create what some have called “the Super Deluxe Buddipole”.

The extra wind loading and weight with everything attached does require a sturdy tripod and mast as it is almost 27 feet from tip to tip with whips fully extended. The rotating arm kit is needed since you must angle the antenna arms up one notch to compensate for the sag.

I use an 18 inch long screw-in type dog anchor under the tripod, attached with a hefty bungee cord to keep the fully loaded mast from possibly tipping over as I am raising/lowering the antenna. A suitable weight could be used instead of the dog anchor if setting up on a cement or paved surface, although you may have to be creative when finding the three guy anchor points. I use a one inch S-hook with one end squeezed closed on the end of each guy cord for easy attachment to the guy plate.

~ AL VE3RRD



Gerry G3MS read our recent story about software and new devices that automate reading and sending CW. Gerry took the time to send us his reaction and offers a site that can help build code speed.

I saw your magazine on the QRZ news page, and found this, and knowing that many Ham operators would like to learn morse (CW is a mode, the same as voice or RTTY, SSTV, etc.) but are afraid that it is difficult, or takes too long, many give up after the first try! There are quite a few morse programs on the internet, and indeed the lazy operators can use decoders, linked to their receivers, to decode the dits and dahs but... where is the pleasure and sense of achievement in doing that?

Is anyone really proud to say "I can talk over a radio because I am licensed?" which is about the same skill level as needed to use WhatsApp or make a phone call on a mobile (cell) phone. Agreed you need to be able to pass certain "tech" questions with a 25% chance of guessing the right answer to gain a licence and callsign, and to be able to call yourself a Radio Amateur, but does that make using voice or other digital decoders any more skillful than using a mobile phone? Much better to persevere and gain a REAL SKILL to be proud of.

OK, rant over. What many Radio Amateurs do lack, is someone who will guide them and mentor them, and have the patience to teach them and support them in their efforts to improve their skill levels. Ham radio clubs are one way of doing this but, often they are seen as a "social" gathering place, more than a place where the real guidance and education can be obtained. Many Radio Amateurs are "singular" people. They live in their own world, and

rarely meet face to face, with other hams, except maybe once a year at a Hamfest or junk sale gathering, which presents difficulties for those that would like to learn Morse, and where to start.

[CWCOM](#) can be used by anyone who is interested in COMMUNICATION by MORSE, rather than just giving a 599 tnx report. CWCOM is a "LIVE" method of using the internet to learn/practice/chat and improve the skill of Morse communication over the internet, with worldwide contacts and no QRM/QSB. CWCOM can be used by individuals to privately learn Morse, or it can be used by ham radio clubs as an "in-house" or "remote" classroom experience, ideal for those hams who live in remote areas and are some travelling distance away from the club house location.

CWCOM was written by an Australian Radio Ham, John Samin, for Windows 95, but can be used on any windows operating system up to the present time. It can also be made to run on Linux and Mac machines. But this is not straightforward and needs some "command line/terminal" work to achieve. Full instructions are on relevant pages of the blog.

I have been using CWCOM for about 10 years, and over that time, I have been in touch with John many times, and about 4 or 5 years ago, he said he was not going to support his website www.mrx.com.au any longer which, would probably mean that CWCOM would be "lost in the annals of history".

I have taken on the mantle of supporting users, old and new, and written a quite extensive blog at: <https://morsepower.blogspot.com/>

There are links on the blog for downloading the program; it's totally FREE. Free to download—free to use—no licence needed, no login, no registration.

Pages on the blog are divided up into useful "help" style sections, all written by me, from my own practical experience. (with some useful externals from Mac and Morse learning inputs). Each page is written in a simple "step by step" guide on how to do things, including pictures where possible, to help understand what is written. There is also an email address to contact me, if you have any problems.

Once installed and running, the operator can use it as a "local" oscillator and decoder to practice their own sending (need to adjust the settings and configurations to get "newbie" Morse to decode properly, but that is explained in the blog page!)

It is a great "tool" for new and existing operators. It is quite "critical" in use, showing up mis-timed symbols as an error on the screen which, if the operator understands what is going on, can help to improve the accuracy of actually making the correctly timed symbols, to decode it properly. For example, if you send out CQ and your "fist" is not quite accurate, it could be decoded as YQ, but of course, the ear and the brain would probably decode it as CQ as that is what would be "expected".

In Morse Communication ACCURACY IS MORE IMPORTANT THAN SPEED, and so, having a program that can detect erroneously made symbols, will improve the skill level of the sender, and that in turn, improves the actual speed of sending. It takes a lot of practice and dedication to practice, to learn morse, but the end result is well worth it.

I am an ex-Royal Navy Wireless Telegraphist (actually L.R.O.(G)). I learned morse in the Royal Navy in 1960 and last used it in 1968.

Between then and about 12 years ago my Morse skills deteriorated, almost back to "newbie" levels! After finding CWCOM, I was on there every day, and have been on every day since. My accuracy soon started to improve and also my speed. I am now sending at about 22 WPM on a straight key, with an accuracy of about 98%, but everyone makes mistakes now and then!

Over the years, I have "mentored" quite a few "newbies" and taken them from a halting 5 wpm with lots of mistakes, to an acceptable 12wpm with fewer mistakes, and I have seen how they have improved, just by gaining what I call "key confidence" by using CWCOM and just chatting with someone who understands the problem of fear of making a hash of it. It gives me a lot of pleasure to know that I have helped them to learn a real "skill" and to be able to pass on my experience, both of learning and using Morse, but also of learning and using a straight key. Also to know that through CWCOM and my help, they are now competent, and confident users of Morse on their radios.

Many "newbies" think that a straight key is old fashioned, and think that if they get a paddle, they will be off and running. However, learning Morse on a straight key, is the best way. Why? Because it reacts to what YOU the operator tells it to do, and by adjusting the way you, and the key, react together, you learn the proper "rhythm" of the sound of Morse code. As you progress you can then take up the option of using a "semi automatic" way of making Morse, i.e. the single or double paddle. This requires that the hand and the brain, work in a "horizontal" way, rather than a "vertical" way to

produce the same Morse code symbols, which is another skill level associated with Morse Communications. Again, it will need a lot of practice and dedication. As time progresses, speed and accuracy will improve, but you have to bear in mind that it is no good sending morse at 35 to 40 wpm on a paddle, and expecting everyone else to be able to read it (some will, but most will not, and those that do will probably be using a software decoder on their computer, linked to their radio!)

For those interested my blogsite (with the links to download CWCOM) is <https://morsepower.blogspot.com/> You do not need a key, as you can either type on screen, use the down arrow key as a straight key, or use the mouse as an Iambic key. Obviously, using an external (proper) Morse key is the best way to learn and use Morse, and there is a page on the blog, on how to connect an external morse key to your computer.

I am 77 years old, now and spend all my daytime using my laptop, so CWCOM is always QRV. My call on there is G3MS. Incidentally, you do not need a callsign, but you can use your name, or a nickname to identify yourself instead of the IP address, which is the default). My QTH is Portsmouth, England, and I am generally QRV from about 08:30 GMT until about 23:00 GMT always ready to help anyone to get started with CWCOM, or just have a good old ragchew/practice session.

~ Gerry G3MS

<https://www.qrzcg.com/call/G3MS>



Ham on the Computer

Ian Abel G3ZHI

*Ideal for new hams starting out
or anyone with limited funds*

*Free voice VoIP apps (apart from Mac)
for radio hams including APRS-position
reporting...*

There are many free VoIP apps for licensed radio hams using either a cell phone or computer. These apps work on Android and Apple phones (apart from Peanut, which is Android only) and any version of Windows. Some applications also work on Macs. As they are for licensed radio amateurs only, you must submit a copy of your ham licence to get registered.

VoIP is ideal if you like to have long chats and like to get know your fellow hams around the world, as the contacts are not affected by radio propagation. They are also useful if you are unable to put up big antennas to work DX. Given that there is now little or no activity on many VHF/UHF simplex and repeater frequencies, VoIP is a good place to find that activity.

Today many HF contacts are very short, and consist of just a quick signal report exchange, and on to the next

one. Some of the rooms on VoIP link out on RF, crossing over to different modes DMR, D-Star, p25, NXDN, m17, Fusion, etc., from analog, so you also do have to be registered for D-Star and DMR to be carried over those networks.

If you have any problems or questions about setting up and getting VoIP apps working please drop me an email: g3zhi@hotmail.com

Here are some of the apps:

Peanut www.pa7lim.nl/peanut/
(excellent audio for people with hearing difficulties)

Dudestar/Droidstar
<http://www.dudetronics.com/index.php/dude-star-radio-project> access to most of the digital modes from a Windows PC or Android device

HamShack Hotline
<http://hamshackhotline.com/> needs a Cisco SIP phone

AllStar <https://www.allstarlink.org/> (to use the web transceiver on a windows computer, use the pale moon browser <https://www.palemoon.org/>. Any problems please contact the author.



There is a video from M0FXB on setting up AllStar at:
<https://www.youtube.com/watch?v=2lefo7xndTg>

Mac users may want to also consider **Transceive** <https://transceive.app> a native MacOS application that lets you administer linked nodes, monitor traffic and transmit audio on your AllStar node. It also supports the AllStar Public Authentication, used by the web transceiver so you can connect directly to public nodes with your AllStar account. You can experience the AllStarLink network without the complexity of setting up a node, but this app is not free.

Echolink <https://secure.echolink.org/>

You may also come across IRLP on your local repeater. Here is the world wide list of connections:

<http://www.irlp.net/status/index.php?PSTA RT=3>

APRSdroid for Android

<https://aprsdroid.org/> shows hams' location if they are beaconing APRS, and others using APRS, (e.g. ships) on the world wide map,

which anyone can look at:

<https://aprs.fi/#!lat=53.4365&lng=-1.354>

APRS for Apple can be downloaded from the Apple app store. Your APRS position can also be sent over the radio on rf.

If you use **Google Earth** you can download the kml/kmz files, which will show Echolink/IRLP nodes, APRS stations and repeaters around the world.

<http://www.irlp.net/setup-irlp.kml> shows IRLP stations locations.

https://secure.echolink.org/node_location.kmz shows Echolink station locations.

<https://rsgb.online/ukrepeater.kml> shows UK repeater locations.

~ Ian G3ZHI (via Southgate News)
www.qsl.net/g3zhi



Free on-line Morse training course starts January

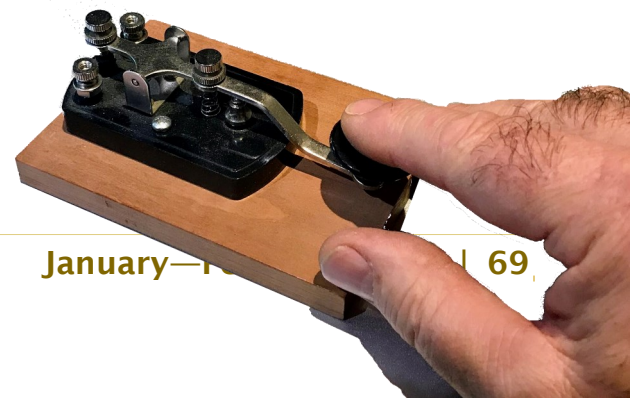
Pre-pandemic Morse training was done at Danbury Village Hall in Essex, UK. Now it's online so everyone can benefit no matter where they live. If you have an interest in learning Morse code, or just want to improve your CW skills, come and join us on a Thursday evening, 7pm UK time - you will be made very welcome.

The course is held on on-line by Skype - <https://join.skype.com/clsfKXKmlNvf> and the schedule is:

Wednesday, January 5, 7pm (1900 GMT), to check Skype communications, and **Thursday, January 6**, your first lesson starting at **7pm (1900 GMT)**. Thereafter every Thursday evening. Contact Andy G0IBN g0ibn1@yahoo.com

Download the Morse training leaflet from
<http://g0mwt.org.uk/training/courses/files/morse/Morse-Classes.pdf>

Chelmsford ARS Morse Training
<http://g0mwt.org.uk/training/index.htm#CW>





Ham on the Computer

Mike Weir VE9KK

A keyboard is a keyboard... but is it?

Frequent readers of my blog know my interest in contesting, and specifically CW contesting. Just a few weeks ago, for the first time, I called CQ in a contest and was running for the entire contest. I had a great time and also a time of growing. As with all bloggers, we have different keyboarding levels. To be a blogger, you have to be somewhat of a typist. There are single finger, two-finger and home row typists. There is a saying "mom knows best" and well in grade 7 I was not so sure about that saying. You see, I had what was called in school a spare period. It was a time slot with no class, and really it was my first one ever, and I planned it as a rest time. Well, mom knows best, and she had to sign off on my spare period and well she had other plans for me.

With my mom it's not a suggestion... it's "your taking typing, and you will end up thanking me for it one day" I went to school in the '70s, and you know how many guys were in typing class... ME!

In I went and well, there was a positive note and that is it was a great place to meet girls; anyway, I digress.

The first thing I noticed was you can't look at the keyboard to find the letters as there were no letters to be found, the keyboard was blank. To make a long story short, I learned about something called home row and I can still hear the teacher calling out "AAA BBB EEE" and so on. I have to admit that yes, mom knows best, and I took 2 semesters of typing class. It made my university years way easier for term papers and so on.

Fast forward to now... getting a blog post together runs along very smoothly, BUT who would have thunk that my CW contest would benefit as well? I found that when I was running in a CW contest, having the ability to not look down at the keyboard was a bonus. I can hear the calls or exchange and just look at the PC screen and enter the information.



She looked at my school timetable and the available classes for my so-called spare period. She found a class that fit right into the spare period time slot... TYPING... yup that's right typing!

Here is the catch... I can type, and my speed is ok for blogging, but typing a call sign and then an exchange at 25-34 WPM takes practice. In the past, I felt keyboard was a keyboard right?? Well, I found over time, frustration and trial and error that all keyboards for contesting anyway are not alike.

The keyboard of choice for the longest time was the wireless Logitech k830. It was a smaller keyboard that had a mouse pad. The keys had a soft touch, meaning not much pressure was needed when typing. Also, the keys were close together, therefore no ambidextrous finger moves to hit certain letters were needed.



When practicing with this keyboard for CW contest call sign copying at slower speeds, it was good, but up around 25 WPM, I found myself hitting two keys at once a lot. At 25 WPM when this happens, you lose track of the next letters coming at you, and it can get frustrating. The Logitech keyboard is not going to cut it.

I went through my PC junk box and found a keyboard called Adesso. This was a small keyboard as well, but with much firmer keys that were raised a bit higher than the Logitech keyboard. I gave this one a go, and yes, I was not hitting two letters at once but when the CW speed increased again there were issues but again.



With firmer keys, I needed to give an extra effort to press each key, and at higher CW speeds it just took too much time to enter the needed info from a contact. Once you miss a letter, your concentration is removed from the CW program and to the keyboard, and hence calls and exchanges are missed.

I have heard it said that most times the solution is right under your nose, and you just can't see it. This was the case with the perfect keyboard. My wife was working from home during the height of the pandemic, and for some time now that has not been the case. Her company PC sat ideal at home for some time now along with a KEYBOARD! It was a full size keyboard, much different from my other go-to keyboards, but I thought I would give it a go. This keyboard is a Lenovo Pro 2 and when she requires it again I have already scoped them out online. I am thinking I will purchase one as a New Years gift for myself.



I have been using it for about 2 weeks now, and it's amazing, the keys are the right height and key sensitivity is spot on as well. Not only that, but I am having no issues copying calls and exchanges around 33-35 wpm. So no, 'a keyboard is a keyboard' is not true. I found that it's a personal thing and once you get the right keyboard for you, it sure can make a difference... in contesting anyway.

~ Mike VE9KK

Mike Weir, VE9KK, writes from New Brunswick, Canada. Contact him at ve9kk@hotmail.com

VE7SL's

Radio Notebook

***D**Xing with the Heathkit CR-1 crystal radio*

Steve McDonald VE7SL



Reproduced with the author's permission, Visit The VE7SL Radio Notebook at: [The VE7SL Radio Notebook](#) and Steve's blog at [VE7SL - Steve - Amateur Radio Blog](#)

If you're a regular blog reader, you will likely recall my description of ["The Enigmatic Heathkit CR-1 Crystal Radio"](#) a few weeks ago.

Back then I mentioned that I was 'eager to get my mitts on one' and that I had arranged to borrow a CR-1 from another VE7 who was fortunate enough to own one.

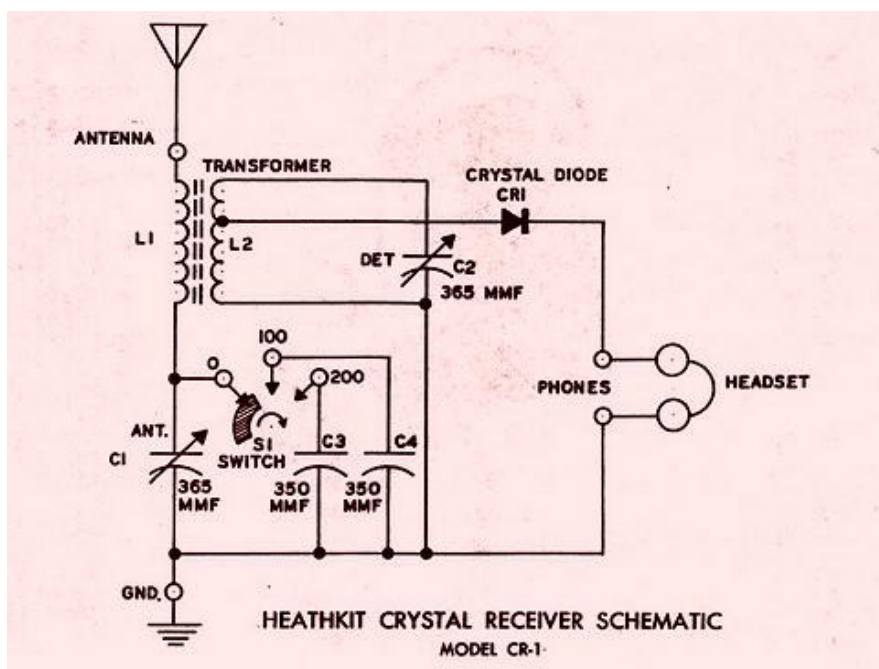
A few weeks after posting the blog, I received an e-mail from Larry WB5OFD, in Texas.

"Reading thru your blogs the other night ... discovered your article on Crystal Radio reception reports. I am in the process of disposing of a lot of radio gear I have collected over the past sixty years and in that pile is a Heathkit CR-1. Yours for free if you would like to have it."

Needless to say I was overjoyed, both at the opportunity to actually own a CR-1 myself and at Larry's exceptional generosity!

Larry went on to explain that he had been in the Air Force and his little CR-1 had been all around the world with him, from Alaska to Turkey... but from its fine appearance, you would never know it.

He was happy to pass it on knowing that it was going to a good home. I am most appreciative of this kind gesture from a fellow radio amateur, knowing that these things are not too easy to find... and are somewhat pricey!



As can be seen in the schematic diagram above, the **CR-1** is a simple double-tuned crystal receiver, utilizing a series-tuned tank circuit for antenna-tuning, inductively coupled into the detector tank circuit. The detector diode, a 50's-era 1N34, is tapped down on the tank for headphone impedance-matching and to reduce circuit loading. Reducing the load on the tank circuit improves selectivity but diminishes sensitivity. Crystal radio design is always a trade-off between these two critical characteristics.

Although I had heard good things about the **CR-1**, I must admit that I was somewhat skeptical... just how good could an unmodified CR-1's simple double-tuned design really be? I was about to find out.

My listening location, on the eastern shoreline of Mayne Island, puts me directly across several miles of saltwater from sixteen exceptionally loud 'blowtorch' signals whose antennas are located near the water on the other side of Georgia Strait. Many of these stations run **50kW...** 24/7. All of these signals are wide and strong, being well-over S9. It is a difficult location for crystal radio DXing as separating weak DX signals from the blowtorches can be challenging.

My previous experience with crystal radio DX is well-documented on my [website here](#). Back then, I quickly adopted the standard protocols to help hear DX. This included the use of a separate 'spotter'

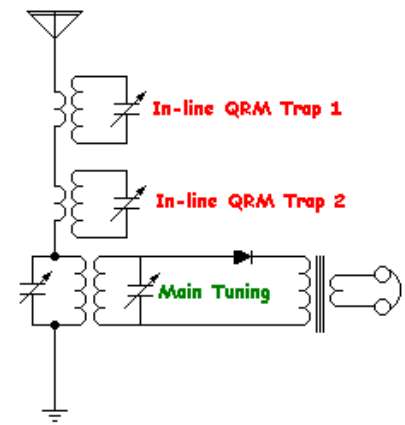
radio to first find signals that might possibly be strong enough to be heard on the crystal detector. I also used an RF signal generator that let me temporarily put a weak tone-modulated carrier on the frequency of a station that I was trying to hear. Using the tone, the antenna tuning as well as the detector circuit can be peaked for maximum signal. I also used a 100 microamp meter in series with the headphones to help peak these circuits accurately. The same protocol was used for my **CR-1** DXing as well.

The second trap is made with a ferrite toroid and Litz wire and produces deeper nulls than the ferrite bar. The bar will soon be replaced by a second toroid trap *[image top next page]*.

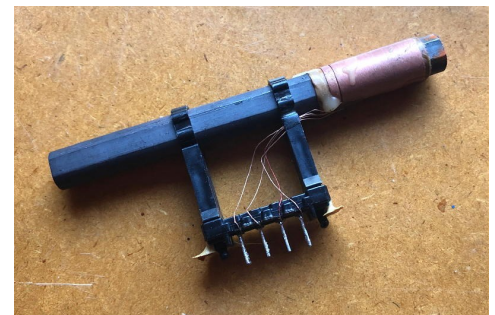
The traps allow me to significantly null any strong signals that could be covering up a nearby weaker signal. For nulling, I set the signal generator on the frequency of the pest signal and then tune the trap for a null while watching the meter. Once everything has been tuned, I'll often just sit and wait for the desired signal to fade up to a detectable level on the crystal radio and then confirm its audio match to what can be heard on the spotter radio. Very often, a signal initially too weak to be detected, will quickly pop up in signal strength to an easy-copy level for several minutes, before dropping below the threshold of diode detection level once again.



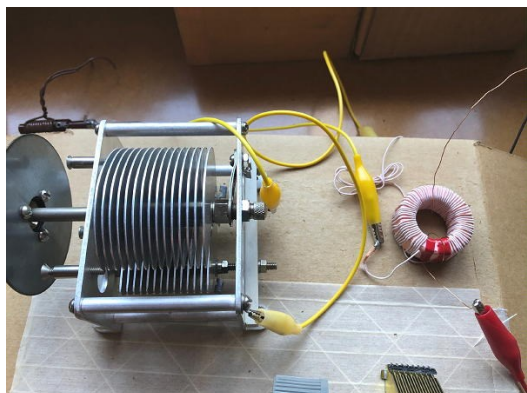
Larry's gift!



Since there are so many very strong signals here, I have added two inline L-C traps on the antenna lead.



My first trap was made from a ferrite bar loopstick inductor salvaged from an old transistor radio.



The second trap is made with a ferrite toroid and Litz wire .



Western Electric 509Ws, manufactured in the late 20s.



The FLR-9 array in Augsburg, Germany

I am presently using a pair of RCA WWII sound-powered ('Big Cans') phones, impedance matched to the **CR-1's** output with a multi-tap audio transformer. I have also used a nice set of extremely sensitive Western Electric 509Ws, manufactured in the late 20's [image left]. These are also impedance-matched to the **CR-1's** output. On weak signal tone tests, I can see only a very tiny improvement with the RCAs versus the old 509Ws as both are very sensitive.

There is a large variation in propagation quality on the broadcast band, especially this far north on the southern edge of the auroral zone. The difference from one night to the next can often be quite dramatic. On most nights the band favors the north-south path while on geomagnetically quieter nights it's the east-west path that dominates. The band needs to be in good shape for any worthwhile hope of DX on a crystal radio.

On one of the recent better nights, one of the stations in Alberta was so strong that it needed trapping! This was something I saw quite often with my previous DX set but I didn't expect to see it with the **CR-1**.

For crystal radio DX, **propagation is the best helper**. Small incremental improvements (in terms of db losses) can be made in any part of a crystal radio's systems but on nights of good propagation,

tens of db improvement will magically appear, thanks to Mother Nature!

When in Turkey, Larry had the opportunity to connect the **CR-1** to the large FLR-9 circular antenna array [image lower left] used during the cold war for HF direction-finding of targeted signals. Covering 1.5MHz to 30MHz, the FLR-9 consisted of ninety-six 120' towers, suspending 1056 vertical elements... all over a 1500' diameter ground screen! His notes show that he logged the BBC, Italy and West Germany on the **CR-1** while using the array!

Although the antenna system connected to my **CR-1** is not nearly as impressive as an FLR-9 array, it is very capable on the broadcast band. I'm using my 630m inverted-L, bypassing the tuning and 50-ohm impedance matching system, essentially feeding it as a top-loaded vertical wire. The (somewhat slanted) vertical wire is approximately 70' which is then attached to a 3-wire 100' long tophat. The antenna is very close to the ocean and parallel with the beach. The **CR-1** ground system consists of about 60 buried radials, varying in length from 30-60'. The basic antenna is self-resonant at around 1200kHz.

Over about two weeks of evening listening, mostly between 9:30 and 10:30PM, I've logged 50 different stations... far more than I had expected to hear.

The log [right] shows all of the stations heard. The stations in red are all local line-of-sight transmitters and are extremely strong... all are well over S9 on my Sony spotter radio. The stations shown in blue are all 'DX', with the furthest so far being KOA in Denver, at 1100 miles.

The log illustrates just how much the blowtorch signals prevent weak-signal detection, even with traps! The stations logged on 1510 and 1530 were only possible when the 1550 blowtorch lost their audio for about five minutes one evening! Selectivity becomes increasingly more difficult towards the top end of the band and, unfortunately, there is a larger concentration of strong locals (who seem to delight in over modulation and splatter), making reception up there extremely challenging.

There are still some lower-band signals that I have yet to log and they have been gradually growing stronger as the nights get longer. As well, the region above 1600kHz may still provide a few opportunities over the next few weeks, if the loud local on 1600 can be sufficiently trapped ... the next few weeks will tell if there's anything left in the CR-1's tank!

Designing and building a crystal radio capable of hearing DX is a wonderful way to learn about circuit losses as each tiny system improvement can be quickly noticed. There has recently (2021) been interest in renewing the once very popular "Crystal Radio DX Contests" that ran a few years ago over a one week period. Perhaps it's a challenge you might like to investigate as well.

~ Steve VE7SL

	kHz	CALL	Day kW	Night kW	QTH	Comments
1	540	CBK	50	50	Watrous, SK	808mi
2	550	KARI	5	2.5	Blaine, WA	
3	570	KVI	5	5	Seattle, WA	
4	580	KIDO	5	5	Nampa, ID	485mi
5	590	KQNT	5	5	Spokane, WA	282mi
6	600	CJWW	25	8	Saskatoon, SK	763mi
7	610	KONA	5	5	Kennewick, WA	266mi
8	620	KPOJ	25	10	Portland, OR	231mi
9	630	CHED	50	50	Edmonton, AB	534mi
10	650	CISL	20	4	Richmond, BC	
11	660	CFFR	50	50	Calgary, AB	438mi
12	670	KBOI	50	50	Boise, ID	494mi
13	690	CBU	25	25	Richmond, BC	
14	730	CHMJ	50	50	Delta, BC	
15	790	KGMI	5	1	Bellingham, WA	
16	800	CKOR	10	0.5	Penticton, BC	173mi
17	810	KGO	50	50	San Francisco, CA	765mi
18	820	KGNW	50	5	Seattle, WA	
19	840	CKBX	1	0.5	100 Mile Hse, BC	213mi
20	850	KOA	50	50	Denver, CO	1098mi
21	860	CBKF	10	10	Saskatoon, SK	763mi
22	880	KIXI	50	10	Seattle, WA	
23	890	CJDC	10	10	Dawson, Crk, BC	496mi
24	900	CKBI	10	10	Prince Albert, SK	816mi
25	910	CKDQ	50	50	Drumheller, AB	502mi
26	920	KXLY	20	5	Spokane, WA	282mi
27	930	KBAI	1	0.5	Bellingham, WA	
28	940	CJGX	50	10	Yorkton, SK	935mi
29	950	KJR	50	50	Seattle, WA	
30	960	CFAC	50	50	Calgary, AB	438mi
31	980	CKNW	50	50	Surrey, BC	
32	1000	KOMO	50	50	Seattle, WA	
33	1010	CBR	50	50	Calgary, AB	438mi
34	1040	CKST	25	25	Langley, BC	
35	1060	CKMX	50	50	Calgary, AB	438mi
36	1080	KFXX	50	9	Portland, OR	231mi
37	1090	KFNQ	50	50	Seattle, WA	
38	1130	CKWX	50	50	Richmond, BC	
39	1140	CHRB	50	46	High River, AB	484mi
40	1160	KSL	50	50	Salt Lake City, UT	788mi
49	1170	KPUG	10	5	Bellingham, WA	
41	1200	CJRJ	25	25	Richmond, BC	
42	1260	CFRN	50	50	Edmonton, AB	534mi
43	1320	CHMB	50	50	Richmond, BC	
44	1410	CFTE	50	50	Richmond, BC	
45	1470	CJVB	50	50	Richmond, BC	
46	1510	KGA	50	15	Spokane, WA	282mi
47	1530	KFBK	50	50	Sacramento, CA	714mi
48	1550	KRPI	50	10	Ferndale, WA	
49	1600	KVRI	50	10	Blaine, WA	
50	1640	KDZR	10	1	Lake Oswego, OR	238mi



Mike Weir VE9KK

My ham radio adventure continues...

Around this time last year, I registered for the CWops intermediate CW course. The CWops is a worldwide group of radio ops that support the operation of CW. On top of this, they want to help up-and-coming CW ops as well as those (like me) who want to improve their speed. As for me, I wanted to improve my speed and learn how to head copy morse code. For me, I found when receiving around 20wpm and up it's very hard to write things down and keep up with the conversation.

So as I was saying last year around this time I applied to join the CWops intermediate CW class. With joining they ask for a commitment to 1 hour a day of practice time and once a week taking part in an online zoom style class time. I was accepted and as the time came near to begin the class COVID had my wife working from home. This meant our hobby room was also doubling as her office. This was a huge problem as she is always doing video conferencing as well as Webex phone calls. Her office hours were all over the map as she works with counterparts in many world time zones. I ended up cancelling my

placement in the CWops class as I wanted to leave it open for someone who was sure they could dedicate the time needed.

Well here we are a year later and my wife is now basically retired and I have lots around the

house on the go but I still wanted to get my CW speed up and nail down this head copy biz. I ended up going to the CWops website and downloading the study material and I made a commitment to set aside time each day and go through the drills, studies and practice... but on my own. I am happy to say that I have been going full tilt for the last 18 days and things are coming along.

I am now starting to get the head copy gig, not a hundred percent yet but I am on my way. My other goal is to get to the point that in a CW contest I can start calling CQ contest and not have to search and pounce for contacts. My issue with not calling CQ contest at this point is I feel my CW speed is not up to par. I feel that I will just be a frustration to other operators in the contest who are trying to complete a contact with me.

Here is a link to the CWops website. Pay them a visit and look around at the links even if your not interested in moving up the CW speed ladder. You can learn CW with them or pick up some great links to other CW-related information.

Well, I press on in my continual CW adventure!

~ Mike VE9KK

Mike Weir, VE9KK, writes from New Brunswick, Canada. Contact him at ve9kk@hotmail.com.

[VE9KK Blog \(ve3wdm.blogspot.com\)](https://ve3wdm.blogspot.com)





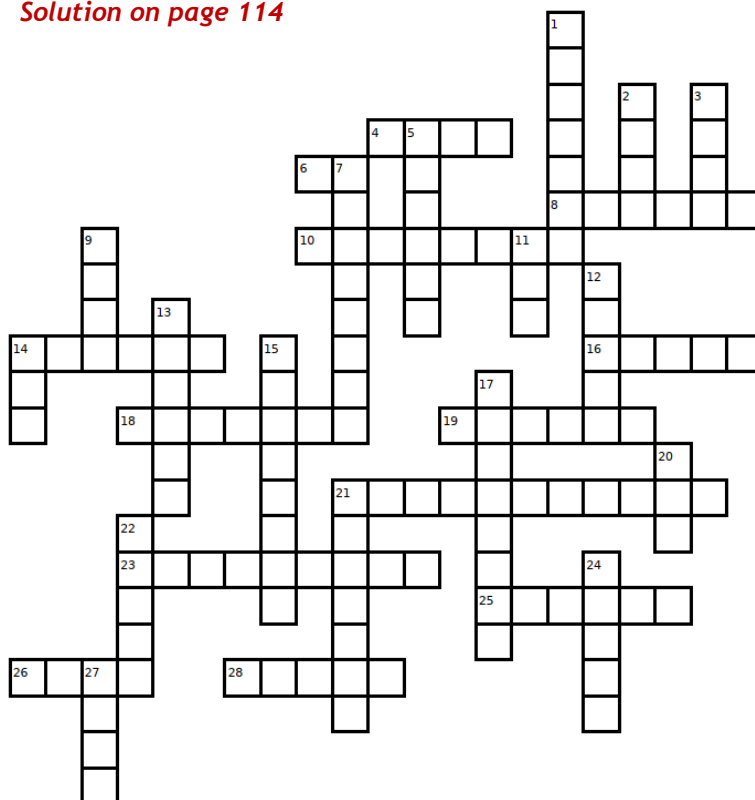
Down:

1. programmed receiver primarily for VHF and UHF bands
2. 88: _____ and kisses
3. abbreviation refers to audio rather than data
5. an antenna that uses an amplifier as part of its design
7. cable (normally coaxial) for carrying radio frequency signals
9. voltage standing wave ratio
11. OM - _____ man
12. CW
13. another word for antenna
14. beat frequency oscillator
15. occasional E layer of intense ionization
17. _____ frequency oscillator
20. antenna tuning unit
21. used to mute or turn off the audio when no signal is present
22. another name for a vacuum tube
24. electronic Morse key
27. _____ business

Across:

4. antenna which is direction and beams the power in a given direction
6. audio frequency
8. the meter band for CB
10. resists the flow of current
14. power amplifier used to increase the output of a transmitter
16. OK
18. wide band antenna
19. sends data in short bursts
21. characteristic in a receiver to pick up weak signals
23. modulation type
25. amplifier that avoids distortion of the signal
26. XYL
28. radio room originally a ship's radio room, but now often used to describe a radio ham's station

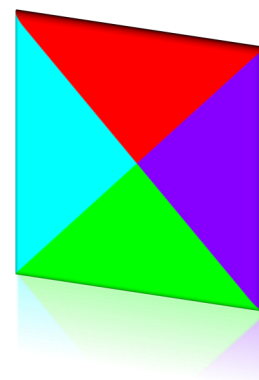
Solution on page 114



Foundations Of Amateur Radio

Defeating the pitfalls of predicting HF propagation

Onno Benschop
VK6FLAB



Podcast

*To listen to the
podcast, visit the
website:
<http://podcasts.vk6flab.com/>. You can also use
your podcast tool of
choice and search for
my callsign, VK6FLAB.*

*Full instructions on
how to listen are here:
<https://podcasts.vk6flab.com/about/help>*

As you might know, I like to transmit with as little power as possible, known as QRP operation. My own station runs at 5 Watts, since on HF, that's as low as my radio will go. I could go lower by turning down the microphone gain, which interestingly is how some radios actually operate, but for now, 5 Watts seems to be a good starting point and truth be told, even though I've been here for a while, I feel like I'm learning something new every day.

One of the largest challenges associated with using low power on HF is propagation on the HF bands which is more fluid than ever. There's plenty of variables. For example, in addition to the day-night cycle, there's Earth's magnetic field, the impact from coronal mass ejections as well as the solar cycle. As that cycle waxes and wanes, or in my case, wanes and waxes, propagation trends are affected on a longer term basis.

There's all manner of tools to explore this. The Australian Space Weather Service is one of many such bodies that create ionospheric prediction maps showing frequencies and their propagation through the ionosphere. Then there's the derivative ones that use this data to declare if a band is open or closed, spread widely across the globe with little in the way of context, like time, or location.

There are tools like VOACAP which attempt to predict the point-to-point path loss and transceiver coverage dependent on antennas, solar weather and time and date. They also attempt to arrive at a so-called MUF, the Maximum Usable Frequency, defined as the highest frequency at which ionospheric communication is possible for 50% of the days in a month. The LUF, the Lowest Usable Frequency is defined as the frequency at which communication is possible 90% of the days of the month.

All these tools have one thing in common. They're predictions and forecasts. They reflect an attempt at quantifying reality. There is a place for this, but my often repeated encouragement of getting on air to make some noise is advice that covers the gap between prediction and reality.

I've long been a fan of using Weak Signal Propagation Reporter, or WSPR as a tool to measure actual propagation. What I like most about it is that it can be used on your own station, using your own antenna, at any time.

It occurred to me the other day that there must be a relationship between a WSPR signal and a voice signal. Not a mathematical one, but one that makes the difference between establishing a voice contact with another station and calling CQ until you're blue in the face.

With that in mind I took a leap and purchased a ZachTek Desktop WSPR transmitter, capable of operating on all the HF bands that my license permits. It was shipped from Sweden this week and it is expected to take more than a month to get to me, likely most of that travelling between Sydney and Perth, but when it does, I'll be able to set up my own in-house 200 milliwatt beacon that will show me just how far my signal goes on the bands that I pick. As an aside, I'm still looking for a similar solution for 2m and 70cm since there are all manner of interesting propagation phenomena associated with those bands as well.

I'm still digging into how I can best gather the reception data to visualise it and I'm working on a strategy that can send me an alert when a particular band is open from my station at such a level that I can look to operating a particular mode, like FT8, or SSB, or anything that I might choose.

The data is public, thanks to the various WSPR reporting systems around, so others in my grid square, likely beyond that, will also be able to benefit from my beacon. I'm considering generating a propagation map from my own station and publish that, but it's too early to say what's involved in making that happen.

Right now I've dived into the rabbit-hole associated with finding a suitable antenna. My current station vertical requires a tuner and I don't think that finding a way to tune my antenna every time the beacon changes band is a good solution.

I suspect that I'll also need to come up with a way to have two transmitters share the same antenna, but I'll cross that bridge when I need to.

Once the beacon arrives, it's my intention to start with 10m as my beacon band using my current antenna, since 10m is on the verge of being useful for my QRP adventures and I must confess, I'm looking forward to making a voice contact with the other side of the planet with my station for the first time in a long time.

What kinds of things can you think of that would benefit from a solution like this?

~ I'm Onno VK6FLAB~ I'm Onno VK6FLAB

Amateur Radio and the art of getting started...

All podcast transcripts are collated and edited in an annual volume which you can find by searching for my callsign on your local Amazon store, or visit my author page: <http://amazon.com/author/owh>. Volume 7 is out now.

Feel free to get in touch directly via email: cq@vk6flab.com, follow on twitter: [@vk6flab](https://twitter.com/vk6flab) or check the website for more: <http://vk6flab.com/>

If you'd like to join a weekly net for new and returning amateurs, check out the details at <http://ftroop.vk6flab.com/>, the net runs every week on Saturday, from 00:00 to 01:00 UTC on EchoLink, IRLP, ALLStar Link, IRN and 2m/70cm FM via various repeaters.

If you'd like to participate in discussion about the podcast or about amateur radio, you can visit the Facebook group: <https://www.facebook.com/groups/foundations.itmaze>

This podcast episode was produced by Onno (VK6FLAB). You can find more at <http://vk6flab.com/>

One of the regular topics of conversation in amateur radio, especially for those new to the community, is where to start? The sheer volume of available options is often overwhelming. If you've never encountered the complexity associated with this amazing hobby the experience can be disheartening and even demoralising.

In my early years I was results driven. Getting on air, making noise, logging a contact, adding a country, winning a contest, rinse and repeat, get better, do more. There have been numerous occasions when I came home from one of my adventures disappointed, sometimes bitterly so.

That happened for quite some time, until one day I realised that the journey in and of itself is the reward.

That might sound disingenuous, so let me illustrate.

This week I set-up an automatic beacon in my shack that can be heard by stations around the planet, letting me know just how far my signal can travel at any particular moment, using my own station antenna and local propagation. As projects go, it continues to be an adventure.

As you might recall, I like low power operation, truth be told, I love low power. The smaller, the

better. Less is more and all that. I recently completed the first leg of a journey to set-up a permanent beacon. For years I'd been dabbling around the edges. On the weekend, whilst I was in my shack, I'd regularly set-up my computer and radio, set it to WSPR beacon and see what stations heard me. I couldn't turn my radio below 5 Watts, so that's what I used. Before you start, yes, I could turn down the volume, but that involves math and I wanted a result, now.

It filled a gap using WSPR, Weak Signal Propagation Reporter, like that. For a while, I improved on things by having a receiver set-up that monitored the bands all day every day and recently I turned it back on, with limited success, more on that shortly.

What I really wanted was to see where my signal was going, not what I could hear. I received a few emails suggesting that a ZachTek WSPR Desktop transmitter, built and sold by Harry, SM7PNV, would be just the ticket. It's a little metal box with USB and SMA connectors. One SMA for the supplied GPS antenna, used for location and time, the other for a transmit antenna. USB provides serial for configuration and power if it's operating in stand-alone mode. Yes, you can operate it without needing a computer and if you want it does band-hopping. After configuring it with things like your callsign and

bands, you can plug-in the GPS, your antenna and power it via USB and it will run as an automatic 200 milliwatt WSPR beacon.

That device in turn prompted a journey to discover a more appropriate antenna, since my current station antenna uses an automatic tuner that won't get triggered by this tiny transmitter. That caused an exploration in how and where to mount any new antenna, with a side-trip into finding a specific anti-seize compound locally. To pick the mounting hardware, I had to get into wind loading, how strong my satellite dish mount might be, how to install and tune a multi-band antenna. The list just keeps growing and that voyage continues.

I'm tracking the requirements with a project specific check-list, just to make sure that I don't miss any steps and have a place to document new discoveries when they invariably hit me in the face. So-far, so-good.

The WSPR monitor receiver is currently connected to a generic telescopic dipole, mounted indoors, which in the past gave me a much better result than my station vertical, so I should be able to keep both running.

Next on the list is to construct a live propagation map for my station, then a way to switch modes on that map, so I can tell if it's worth calling CQ without going blue in the face. I'm also working on a WSPR transmitter for 2m and 70cm, because they are under served in my neck of the woods.

The takeaway from all this is that whilst there are many steps, and truth be told, that list is growing as I learn, each step is tiny and doable. The only thing that separates me from someone who doesn't know where to start, is this.

I started. You can too. Anywhere. Doesn't matter. Pick anything that tickles your fancy. Start digging. It's a hobby, not a profession. What ever floats your boat, what ever makes you excited, what ever you're interested in, pick it and do something, anything.

That's how you get anywhere in Amateur Radio, and Open Source, and life for that matter, just start.

~ I'm Onno VK6FLAB



Early mobile operation?

KB6NU's Column

Dan Romanchik, KB6NU

A Wikipedia for ham radio?



I and co-author David Sawicki, WA3DS, just finished the Ham Radio Reference. The book contains an extensive glossary of amateur radio terms, as well as some operating aids, Part 97 rules, and technical information. The book is available in both PDF and Kindle versions.

Yesterday, I sent copies to my colleagues at Amateur Radio Digital Communications (ARDC). Rosy, KJ7RYV, our executive director, wrote back:

"Dan, this is great! Thank you."

When he's not trying to figure out which way current flows, Dan blogs about amateur radio at KB6NU.com, teaches ham radio classes, and operates CW on the HF bands. Look for him on 30m, 40m, and 80m. You can email him at cwgeek@kb6nu.com.

I wonderr... what if we made a page on our website that was just a set of links to references like this. It could be helpful, especially for beginners. What do you think?

We had just created a list of other amateur radio resources for internal use, and had a similar thought about putting that list online. I replied:

I had a similar thought about creating an online resource after we created the list of amateur radio resources.

Then, it occurred to me that someone had done this before: AC6V.Com. Unfortunately, as is noted on the website, "NOTE: AC6V.com is an archive of Rod/AC6V's webpages, and is no longer being updated." Rod became an SK 5 or 6 years ago, and there are lots of dead links and outdated information on the site, and there are a lot of new resources—like this book—that are missing.

Having said that, we could try to set up a "Wikipedia for ham radio." It would be a lot of work, but if we could recruit a community of editors, then it might be doable.

So, I'm throwing this out there. Do you think it's worth creating an up-to-date AC6V.Com? Would you be willing to help? Should it be a wiki or perhaps some other kind of website? Let me know here in the comments or email me directly.

~ Dan KB6NU

Operating notes: Homebrew keys, callsign fun

Homebrew cootie key cuts through QRN, QRM

A couple of days ago, I worked a guy who said he was using a homebrew sideswiper, [or cootie](#), key. I looked him up on [QRZ.Com](#), where he featured a photo of his key. After seeing this photo, I tweeted:

“Just worked a guy using this homebrew cootie key. It really cuts through the QRM and QRN.”

I included the photo in the tweet.

That really caught the eye of my followers. More than two dozen have either liked or commented on it.

Homebrew paddle uses hard disk drive bearing

Last night, I worked a fellow who also noted that he was using a homebrew paddle. He said that it was similar, but not exactly like the paddle built by N2HO [shown at right].

The unique thing about this key is that it uses the magnet and bearing from a hard disk drive. I don't know if or how the magnetic tension is controlled, but I think the design is quite unique.

Callsign fun

In the past week or so, I've worked stations with fun callsigns. the first is AI5IN. Joe's call not only spells a word, but it is palindromic, if you consider the sequence of dits and dahs.

Last night, I worked K5EMI. Bill didn't mention why he chose this particular call, and I wonder if he knew that EMI is an acronym for electromagnetic interference. I may have to email him about that.



~ Dan KB6NU



Steve McLean 17 6 days ago

This News Letter, called the Communicator, which is published bi-monthly, is read across 139 countries WW.



Bill Nadzam 6 days ago

Impressive amount of topics for a newsletter. Thanks for sharing. I just skimmed over it, but as time permits I'll read it over in detail.



Pete Wightman 6 days ago

Oooh, it is a rather nice magazine !!



Glen Overby 6 days ago

lots of interesting articles!



John Reed 17 6 days ago

Thanks, Steve!



Eric Lund 6 days ago

That is an impressive newsletter.



Eric Lund 6 days ago

Definitely going to spend some time with this issue. Is there a place to subscribe / contribute to this effort?



No-Ham Recipes

Nilay Mine Aydogmus TA3YJ

Beef stuffed artichokes (Etli enginar dolmasi)

From Nilay in Turkey comes this mouth watering recipe, excellent as a side dish.

- 2 large lemons, halved
- 4 medium to large artichokes
- 4 teaspoons (20 ml) butter
- 4 small pieces of fresh tomato (to cover filling in artichoke)
- 2 tablespoons (30 ml) crushed, canned tomatoes, whisked with 1/2 cup hot water

Filling:

- 1 tablespoon (15 ml) dill, finely chopped
- 4 tablespoons (60 ml) white rice, rinsed
- 4 green onions, finely chopped
- 2 tablespoons (30 ml) parsley, chopped
- 1 tomato, peeled, seeds discarded, finely chopped
- 5.3 ounces (.33 pound or 150 g) ground lamb or medium-ground beef

Squeeze juice from 3 lemon halves into large bowl of cold water and add the squeezed lemon halves. Cut off the stem and top 1/4 of the artichoke and discard. Rub trimmed areas with remaining lemon half and set lemon aside. Starting at the base, bend the tough outer leaves back and snap off where they break naturally, leaving more tender to very tender inner leaves. Leave some of the tough leaves in place to help keep the dolma (stuffed artichoke) intact during cooking, otherwise, the dolma will fall apart. Then trim off the tips of all the leaves using scissors, and rub cut areas with the lemon.

Push your thumbs into the artichoke center and gently press outwards to open up the leaves. With a spoon, scoop out and discard the fibrous choke. Scoop carefully to preserve the bottom and the heart of the artichoke. Place artichokes in the water and lemon juice mixture to prevent discoloration.

Using a tablespoon, mix all the filling ingredients. Remove artichokes from water and drain them upside down. After draining, stuff the centers of the artichokes with filling, leaving some room at the top of each to cover the filling with a piece of tomato.



Place the artichokes in a small pot, putting butter on top of each. Pour the water mixed with crushed tomato down the side of the pot to avoid splashing the artichokes. Add enough water to the pot to steam the artichokes; if necessary, add extra hot water to the pot as the water level gets too low. Cook on medium-low heat (with the lid covering half the pot) for 30 minutes, or until the artichokes are tender.

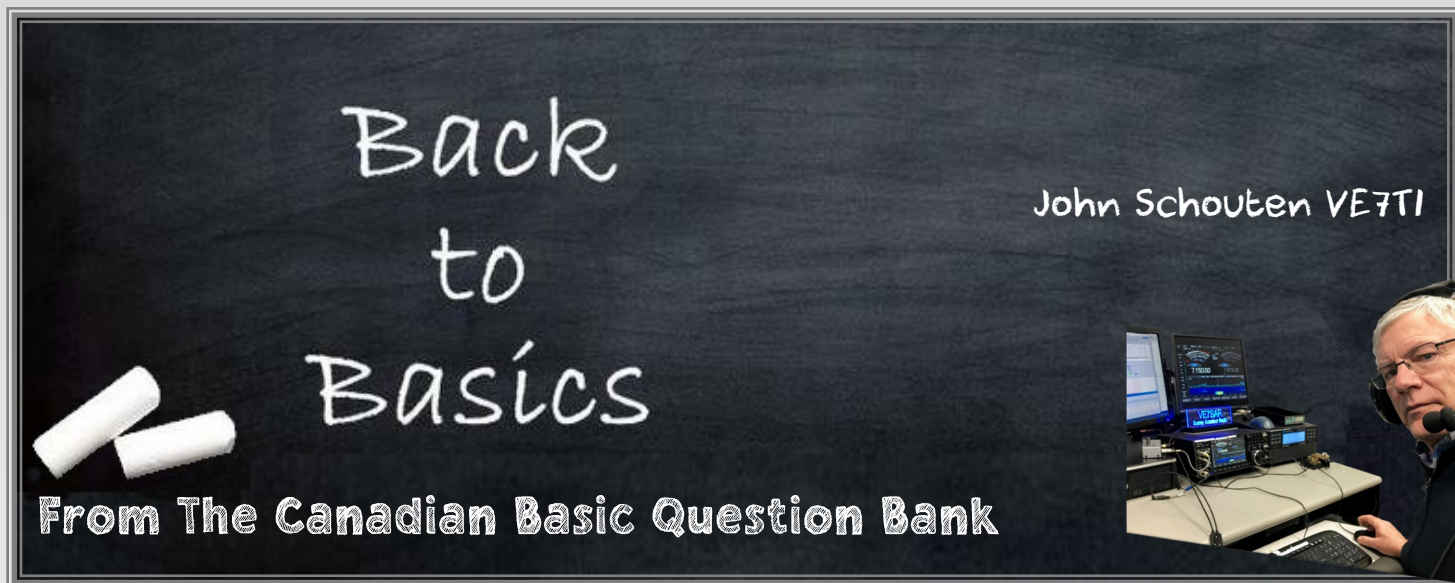
Place artichokes on a plate, pouring onto them some tomato sauce from the steaming pot. Remove the hard leaves with a fork and discard. Serve the stuffed artichokes with yogurt with garlic on the side.

Afiyet olsun,

~ Nilay TA3YJ

Thanks to the folks at QRZ.com we got a mention on their home page and it resulted in many, many visits to our site to download The Communicator.

The screenshot shows the QRZ.COM website interface. The top navigation bar includes links for Database, News, Forums, Store, Swapmeet, Resources, Contact, Subscribe, and Login. The main content area is divided into several sections. On the left, there's a sidebar with various advertisements. The main content area features a 'Featured Member' section with a 'CX4DI' profile, a 'New FT8 Software - AutoFT8' announcement, and a 'The November-December Communicator e-Magazine' announcement. There is also a 'QRZ Trivia' section with a question about a 500,000 watt standard AM radio station in Cincinnati, Ohio. The page is cluttered with various advertisements and a sidebar on the left with more ads.



Propagation and ionization

Our question for this edition deals with propagation and the ionization of the atmosphere

B-7-4-2 What causes distant AM broadcast and 160 metre ham band stations not to be heard during daytime hours?

- A The presence of ionized clouds in the E region
- B The splitting of the F region
- C The weather below the ionosphere
- D The ionization of the D region

The 535 to 1,705-kHz frequency band, which broadcast AM occupies, is classified as a medium frequency (MF) radio band. Medium wave signals follow the curvature of the Earth, using ground wave propagation, but can also bounce off the ionosphere at night, resulting in skywave propagation.

With the addition of skywave propagation, AM broadcast signals can travel great distances — 500 miles or more. If you've never tried it, fire up your radio some night and see how many distant AM radio

stations you can tune in. As a kid and teen, getting interested in radio, I would often listen to stations from San Francisco and beyond on my inexpensive AM receiver.

The 160-meter band refers to the band of radio frequencies between 1.8 and 2 MHz, just above the medium wave broadcast band. For many decades the lowest radio frequency band allocated for use by amateur radio, before the adoption, at the beginning of the 21st century in most countries, of the 630- and 2200-meter bands.

Amateur operators often refer to 160 meters as the Top Band. It is also sometimes nicknamed the "Gentleman's Band" in contrast to the often-freewheeling activity in the 80-, 40- and 20-meter bands.

While the phenomenon of better night-time radio reception might be foreign to a generation brought up on podcasts and streaming media, anyone who grew up tuning into far off radio channels late at night (or continuing to do so) can attest to the startling clarity a midnight stroll around the radio dial can provide.



Why exactly are distant AM and shortwave radio stations so much clearer at night? While it would be tempting to imagine it has something to do with the cool night air or the silence that typically permeates the evening, the secret lies miles and miles above the surface of the Earth in the ionosphere.

During the day, the ionosphere is bombarded by sunlight which ionizes the molecules in it. At night when the sun is blocked by the Earth, the lower levels lose their ionization while the upper and less dense levels remain fairly well ionized and full of energy. During this period of time, radio waves pass into the upper reaches of the ionosphere where they collide with the highly energized electrons of the ionized molecules.

When the radio wave frequency and the electrons fall into alignment, the electrons give the signal a boost and shoot it back down to Earth. Depending on the conditions, this can happen several times in a row and, in the process, propagate the radio signal well beyond its daytime range.

In fact, the propagation can be so significant that AM radio stations can easily broadcast in a thousand mile radius and shortwave signals can often bounce around the curvature of the Earth and be heard across oceans.

As a result of this, many AM stations either lower their broadcast power at night or kill their signal completely lest they spill over into other radio station's broadcast territory. There are, after all, only around 100 AM radio channel frequencies in use but thousands upon thousands of AM radio stations. If all stations stayed at full broadcasting power at night, the radio would become unusable across entire continents.

This phenomenon doesn't affect FM broadcasts as FM radio frequencies are propagated almost entirely by a phenomenon known as groundwave propagation.

The shifting of the ionosphere and the increased transmission length produced by extended skywave propagation has little to no impact on FM radio.

So, getting back to our question at the start of this column, the explanation for this exam question, and a couple like it, is that the D layer, lowest of the layers, is fairly dense. Once ionized during daylight hours, it ABSORBS lower frequencies (i.e., 160 m and 80 m). At night it acts like a mirror and reflects signals back to Earth.

The correct answer therefore is 'D' - The ionization of the D region.

~ John VE7TI



**Calling all New Amateurs:
Get your Name in Lights!**

Did you get your Amateur Radio certificate within the past year or two and want to introduce yourself through TCA to the Amateur Radio community? If so we would love to hear from you.

Drop a line to tcamag@yahoo.ca and tell us how you were introduced to the magic of Amateur Radio.

Do you credit any particular Amateur ("Elmer") with getting you started? Which aspect of the hobby do you enjoy so far?

Please be sure to include your name, call sign, date and level of certificate – and don't forget to include a photo or two. We hope to hear from you soon!



Do you need more information about our courses?

<https://bit.ly/SARCcourses> or scan the QR-code with your smart-device camera

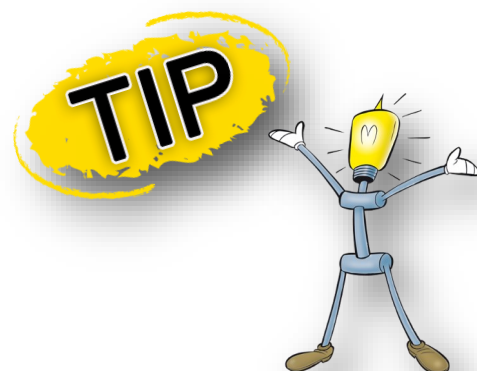
Study Links for more information

Whether you are new to the hobby or brushing up on skills, you should find these study links helpful:

1. RIC-7 is the entire up-to-date Industry Canada (IC) Basic Question Bank.
<http://tinyurl.com/CanadaBasicQB>
2. Industry Canada (ISED) on-line practice page:
https://apc-cap.ic.gc.ca/pls/apc_anon/apeg_practice.practice_form
3. The Amateur Radio Exam Generator is at:
https://www.ic.gc.ca/eic/site/025.nsf/eng/h_00040.html
4. The ExHaminer Study software for Windows is at: <https://wp.rac.ca/exhaminer-v2-5/>
5. VE3YT has an excellent question-based guide available at ve3yt.com

Contact SARC if you wish to write the Basic or Advanced Exam. If you pass we'll even give you a year free as a SARC prospective member!

Newly Licensed? When you receive your paper license in the mail, it will come with a form that can be filled out and mailed to the Radio Amateurs of Canada office, at which point an introductory RAC one-year membership will be set up. Introductory memberships are identical to our existing basic memberships and you will receive The Canadian Amateur magazine for one year.



HAMpuzzle V1.2

Our new students are often confused by the block diagrams for receivers and transmitters. A freeware program to practice assembling block diagrams for the Canadian Amateur Radio Basic certification exam runs under Microsoft Windows (but also works flawlessly on Ubuntu 10.04 + Wine 1.2.2)

HAMpuzzle V1.2 (2014 04) <https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle12.zip>

Be sure to download at least one set of Diagrams from the web page and deposit the bank(s) in the same folder as the program. For Basic:

https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle_Diag_Basic.zip

Radio Amateurs of Canada is pleased to make the HAMpuzzle© program available and extends sincere thanks and congratulations to François Daigneault, VE2AAY, for writing and providing it as freeware to anyone wishing to download it.

~ RAC

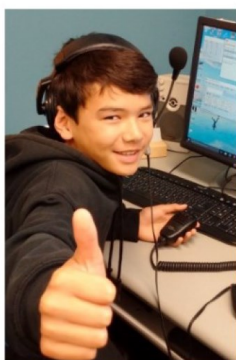
SURREY AMATEUR RADIO basiccourse

OBTAIN YOUR FEDERAL AMATEUR RADIO CERTIFICATE

7-WEEKS · ON-LINE · \$80

Next course starts March 21st — contact sarc@ve7sar.net

Includes classes, a comprehensive manual, videos and the exam fee



- Ideal for outdoors activities. Long range communications anywhere for free without commercial infrastructure
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- Practice an exciting hobby or start a career opportunity



More information needed? Click: <https://bit.ly/SARCCourses> or use the QR code above

80M ARDF Equipment

Always find the Source

80M Fox transmitter

Contact John for pricing and availability - JohnVA7XB@gmail.com
Cost CAD \$99 + Shipping

The new ARDF fox is a highly configurable transmitter with the following features:

- Configurable using a serial terminal through the USB port on a PC
- Configurable call sign identification, CW speed and repetition frequency
- Adjustable fox number from 1 sending “MOE” to 5 sending “MO5”
- Configurable transmission modes
 - Standard (10wpm, on 1 min, off 4 min)
 - Alternate (10wpm, on 1 min, off 1 min)
 - Sprint (10wpm, on 12 s, off 48 s)
 - Fast sprint (15wpm, on 12 s, off 48 s)
- Beacon mode sending “MO” at 10wpm continuously
- Spectator mode sending “S” at 15wpm continuously
- Low battery mode sending MOx once every 5 minutes
- Start of event timer configurable up to 120 minutes
- Start button to synchronize multiple foxes
- Optional short pre-event transmissions one hour before the event start with configurable CW speed
- Flashing LED showing status
 - waiting to begin delayed start – rapid flashing
 - running – on continuously
 - CW transmissions – flashing with CW timing
- Debug mode providing progress reporting via the terminal

Frequency: 3.579 MHz

Range: 300 m

Long Range (1300m) factory option available at extra cost
- Contact us

The TX80M manual is available at:
<http://www.rx80m.com/resources/ARDF-TX-Instruction-Manual---1.003.pdf>





Radio Amateurs of Canada

Garry Hammond, VE3XN and John “Jack” Leahy, VE1ZZ (SK), appointed to the Canadian Amateur Radio Hall of Fame

The Board of Trustees of the Canadian Amateur Radio Hall of Fame is pleased to announce that Garry Hammond, VE3XN and John “Jack” Leahy, VE1ZZ (SK), have been named to the Hall of Fame.

Radio Amateurs of Canada recognizes deserving Amateurs by appointments to the Canadian Amateur Radio Hall of Fame. The Constitution for the Hall specifies that the appointment as Member of the Hall is made for “outstanding achievement and excellence of the highest degree, for serious and sustained service to Amateur Radio in Canada, or to Amateur Radio at large”.

The Trustees of the Hall have interpreted the Constitution to mean that the person has performed significant service over many years to enhance the well-being of Amateur Radio.

Garry Hammond, VE3XN

Radio Amateurs of Canada and the Board of Trustees of CARHOF sincerely congratulate Garry Hammond, VE3XN, on his appointment to the Hall of Fame.

Garry Hammond, VE3XN, has been an Amateur Radio operator for over 55 years. His profession as a Geography Teacher stimulated a special interest in DXing and the pursuit of special prefixes, taking him to both the DXCC Honour Roll and the prefix Honour Roll.

It can be said that he is one of the best known Canadian Amateurs in the world. Operating as VE3GCO, VE3XN and VY0XN - and also using a vast

variety of special prefixes - he has provided a truly massive level of activity on CW, SSB, RTTY and FT8. He has followed each QSO with a QSL and in return has built a huge collection of QSL cards. As well as confirming his own on-air activity he has served as QSL Manager for a number of major DXpeditions. The QSL card has been his hallmark.

Garry was the author of the “DX’ing with Hammond” column in The Canadian Amateur for 10 years. In addition to introducing readers to DXing, his column also extolled the enjoyment of QSL card collecting. He also edited the DX Newsletter “Long Skip” for the nationwide CanaDX organization. He has been a QSL card checker for many years for both the American Radio Relay League and CQ awards, and has also served as a QSL Manager and assisted the Ontario Incoming QSL Bureau.

Garry was granted a life membership in the Kitchener-Waterloo Amateur Radio Club (KWARC) in 2003 in recognition of his contributions to the club through mentoring, QSL card management, presentations (“Hamming with Hammond”), the QSL column in the club newsletter (Kilowatter) and tireless Field Day efforts, often turning in the highest score for the club. His communication skills motivate Amateurs to action.



John “Jack” William Leahy, VE1ZZ (SK)

Radio Amateurs of Canada and the Board of Trustees of CARHOF sincerely congratulate John “Jack” William Leahy, VE1ZZ (SK), on his appointment to the Hall of Fame. Sadly, Jack became a Silent Key on October 18, 2018 at age 85.

Jack Leahy, VE1ZZ, worked at Defence Research Establishment Atlantic (Department of National Defence) for 34 years. When he earned his Amateur Radio licence in 1948 he was the youngest person in Canada to do so. He made friends and contacts from around the world, many of whom visited him at Head Jeddore, Nova Scotia to see his extensive communication towers and system.

His love of Amateur Radio and lowband operation spanned 70 years and he was very well known and respected on-the-air, both for his longevity and his kind way.

Jack gave freely of his experiences and knowledge of lowband DXing and the aspects needed to achieve these feats and he has been described as “one of the finest Topband DXers ever to have lived”. He was recognized throughout the Amateur Radio world as a lowband ambassador for Canada. On 80 and 160

metres his was the premier lowband signal emanating from North America. His operating achievements are well documented in DXCC records at the American Radio Relay League.



It is not just the DX he worked, but how he did it and his attitude and kindness as a true Radio Amateur. He was very friendly to all callers and enjoyed ragchewing, but like most of the best LF DXers appeared to spend a lot of time listening, particularly if there was a new country around.

Jack’s interests were not limited to only the 160 metre band and he enjoyed 80 metres and VLF experimentation as well. He loved to talk to anyone with an interest in Amateur Radio and was always eager to share stories and his vast knowledge on building better rigs and making radio contacts to difficult regions. He won numerous awards and certificates over the years, was featured in books, magazines and local television on his accomplishments in the Amateur Radio world.

Radio Amateurs of Canada and the Board of Trustees of CARHOF sincerely congratulate Garry Hammond, VE3XN and Jack Leahy, VE1ZZ (SK) on their appointments to the Hall of Fame.

A detailed account of their achievements will be presented in an upcoming edition of *The Canadian Amateur* magazine.

For more information on the Canadian Amateur Radio Hall of Fame please visit: <https://wp.rac.ca/carhof/>

*~ Prepared by Frank Davis, VO1HP
Chair, Board of Trustees
Canadian Amateur Radio Hall of Fame*



British Columbia QSO Party 2022

1600z Feb 5 to 0359z Feb 6 **AND** Feb 6 1600z to 2359z Feb 6

Objectives:

- Stations in British Columbia contact other stations in the province as well as the rest of Canada, the United States and beyond.
- Stations outside British Columbia make contacts with VE7/VA7 stations.

- 📌 Original photo certificates for top scores in all classes of entry, BC and outside BC (state/province/DX). New photo every year! Collectible!
- 📌 Special photo certificates for top score in each federal electoral district. (BC stations only)
- 📌 Plaques offered in 10 sponsored categories: Top YL, Top BC single-op, Top BC multi-op, Top US, Top Canada outside BC, Top DX, Top Mixed Mode, Top CW, Most Federal Districts Contacted and Top Club in BC
- 📌 BCQP is fully supported by N1MM contest logging software, CQ/X GPS-enabled software for mobile contesting and N3FJP state QSO party logging program.
- 📌 Follow links at <http://orcadxcc.org/bcqp.html> for rules, tools, helpful hints, and in-depth event analysis/reports and scores from past years.
- 📌 BCQP is included in the State QSO Party Challenge.
Enter competition by posting BCQP score to 3830scores.com

Questions?

Email BCQP Contest Coordinator, Rebecca VA7BEC at va7bec@rac.ca

Join Orca DXCC in BCQP 2022
It's always a whale of a good time!

January 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
2	3	4 1930 SEPAR Net 2000 SARC Net	5	6	7	1/8 COVID Permitting— Coffee: 730-930 AM @ Denny's 6850 King George Blvd., Surrey OTC Open—10-Noon Jan 8 CONTEST: ARRL RTTY Roundup
9 CONTEST: ARRL RTTY Roundup	10 On-line Basic Course 19:00 hrs	11 1930 SEPAR Net 2000 SARC Net	12 SARC General Meeting (Zoom) 1900-2100	13	14	15 COVID Permitting— Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: NA QSO party CW
16 CONTEST: NA QSO party CW	17 On-line Basic Course 19:00 hrs	18 1930 SEPAR Net 2000 SARC Net	19	20 SEPAR Meeting (Zoom) 19-2100	21	22 COVID Permitting— Coffee: 0730-0930 @ Denny's OTC Open: 10-Noon CONTEST: NA QSO party SSB
23 CONTEST: NA QSO party SSB	24 On-line Basic Course 19:00 hrs	25 1930 SEPAR Net 2000 SARC Net	26 1900 SARC Exec Meeting	27	28	29 COVID Permitting— Coffee: 0730-0930 @ Denny's OTC Open—10-Noon
30 CONTEST:	31 On-line Basic Course 19:00 hrs		For details on all SARC events, go to ve7sar.net			

Contest Details: <http://hornucopia.com/contestcal/contestcal.html>

February 2022

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1 1930 SEPAR Net 2000 SARC Net	2	3	4	5 COVID Permitting— Coffee: 730-930 AM @ Denny's 6850 King George Blvd., Surrey OTC Open: 10-Noon CONTEST: BC QSO Party (all mode) CONTEST: VT, MN QSO party (all mode)
6 CONTEST: BC QSO Party (all mode) CONTEST: VT, MN QSO party (all mode)	7 On-line Basic Course 19:00 hrs	8 1930 SEPAR Net 2000 SARC Net	9 SARC General Meeting (Zoom) 1900-2100	10	11	12 COVID Permitting— Coffee: 730-930 AM @ Denny's OTC Open: 10-Noon CONTEST: CQ WW WPX RTTY
13 CONTEST: CQ WW WPX RTTY	14 On-line Basic Course 19:00 hrs	15 1930 SEPAR Net 2000 SARC Net	16	17 SEPAR Meeting (Zoom) 19-2100	18	19 COVID Permitting— Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: ARRL Intl DX CW
20 CONTEST: ARRL Intl DX CW	21 FAMILY DAY HOLIDAY (BC) On-line Basic Course 19:00 hrs	22 1930 SEPAR Net 2000 SARC Net	23 1900 SARC Exec Meeting	24	25	26 COVID Permitting— Coffee: 0730-0930 @ Denny's OTC Open—10-Noon CONTEST: NC, SC QSO Party (all mode)
27 CONTEST: NC, SC QSO Party (all mode)	28 On-line Basic Course—Review 19:00 hrs		For details on all SARC events, go to ve7sar.net			

Contest Details: <http://hornucopia.com/contestcal/contestcal.html>

Local Ham Gear For Sale

More listings at hamshack.ca

For sale are **Four 8' long tower sections** = 32' free standing. The bottom anchors are missing as they were left in the concrete after it was taken down. **\$75.00 or best offer.**

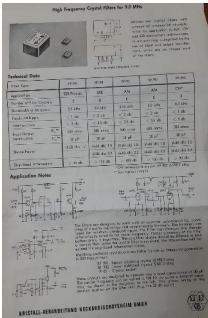
Kjeld also has a rather large Marine Radio (HF boat anchor?) sitting at his home and he'd like to find a new home for it. If you're interested contact him.

Contact: Kjeld VE7GP 604-531-6396 or VE7GP@telus.net

70 cm Fast Scan TV Transmitter

For sale is an analog fast scan (NTSC standard) ATV transmitter in a hardened and waterproof metal case. Suitable for mounting outdoors. Last used by hams at Simon Fraser University on an emergency communications project in the early 1990s. Runs on 12 VDC. Approximately 100 feet of power/antenna/control cables included. As is, but if it doesn't work to your satisfaction you can return it. **\$100 OBO.**

Contact: Kevin McQuiggin VE7ZD/KN7Q mcquiggi@sfu.ca



Crystal Filters

\$60 each or both for \$100, plus shipping.

I have both the XF-9A for SSB TX and the XF-9B for SSB RX plus matching crystals, sockets and spec sheet. These are high quality crystal filters made in Germany. The TX is unused and the RX is like new.

I can also supply crystals to heterodyne 10-15-20-40-80 m to a 9 MHz IF using a 5 -5.5 MHz VFO. And, if you are building a receiver, I can provide 9 MHz IF transformers to match.

WANTED: Old National Geographic and Reader's Digest Magazines.

Contact: John VA7XB va7xb@rac.ca or 604-591-1825

HF Radio Transceiver

Kenwood 450SAT (built in antenna tuner) capable of 100W. It also has the YK88S Filter installed and the Voice Synthesizer option. There is a hand mic for the radio as well.

Along with the radio there is the 20 amp Kenwood PS50 power supply. The radio sells around \$450-500 USD used and the power supply 100-150 USD.

I am asking \$500.00 for the pair.

Contact: Gord VA7GK va7gk@shaw.ca or 604-582-3983



SURREY AMATEUR RADIO COMMUNICATIONS

Radio-Active

Profiles Of SARC Members

Hello I'm Thomas, newly licensed as VE7TOA, though I've been a ham for 22 years and a radio and electronics enthusiast my whole life.

I grew up in South Africa, Johannesburg and Cape Town, and moved to Canada with my family in May 2020, living first in Langley and now in North Vancouver.

My early involvement with amateur radio started through my grandfather, Reginald Abbott (1908-1991), who was licensed as a radio experimenter and told great stories about international communication. In high school Reg was apparently sent from his home in Pretoria, to live with family in Cape Town, because he was spending too much time with his radios, and not enough on his school work. I still have one of his radios, a Barlow Wadley XCR-30 general coverage crystal receiver with SSB, and a treasured set of popular mechanics shop notes from about 1923-1928.

At scouts I attended some JOTAs and was mesmerised by the radios and the communication. Someone also took a group of us along on a balloon chase in about 1990; I don't know if we found

the balloon but I still remember the GPS receiver someone had then, the size of an HF mobile rig, large batteries, but it could tell you your position and speed!

The amateur radio exposure definitely contributed to my interest in electronics, which led me to study engineering. I still try to share my enthusiasm for the hobby with school children where possible, in case it makes a difference or sparks some interest.

I was first licensed in 1999 as ZR6TXA (later ZS6TXA and then ZS1TE). I joined a local club and did many VHF/UHF field day contests, setting up on a mountain top just the right distance from major cities to score maximum points. I ran a few JOTA stations myself and helped with communications on the water at the Kontiki raft-building events. I operated the easy mode J and B FM satellites including SO-35 made in South Africa, and the ISS packet repeater. Being in South Africa meant that if I hadn't first set up a schedule with a friend, I would often have an entire satellite pass to myself, just hearing myself, sometimes with one or two other hams joining in.



Thomas Abbott
VE7TOA

SURREY AMATEUR RADIO COMMUNICATIONS

My current amateur radio interests include 80 m fox-hunting, building antennas and simple radio-related circuits, and operating digital modes, particularly PSK31 and WSPR. I have a small home laboratory, but no antennas installed yet.

I've been fortunate to work in interesting technical fields. The first half of my career was as an antenna engineer and later head of engineering in a defence antenna company. We designed and built many kinds of communication, jamming and direction-finding antennas, and travelling the world to help sell them and maintain them. In 2014 I moved on to SKA South Africa, now called SARAO, as a systems engineer for the integration and verification of the MeerKAT radio telescope. MeerKAT is an array of 64 13.5 m dishes in South Africa, with UHF, L and S band cryogenic receivers. I'm currently the programme manager for the telescope.

MeerKAT has been taking scientific observations since 2018. Since then we've released additional features to improve its capability - new operation modes and additional frequency bands. It has been wonderful to work with an amazing engineering team in building, integrating and testing this instrument, and with the scientists that use it to learn about the universe.

More MeerKAT photos here:

<https://www.sarao.ac.za/science/meerkat/>

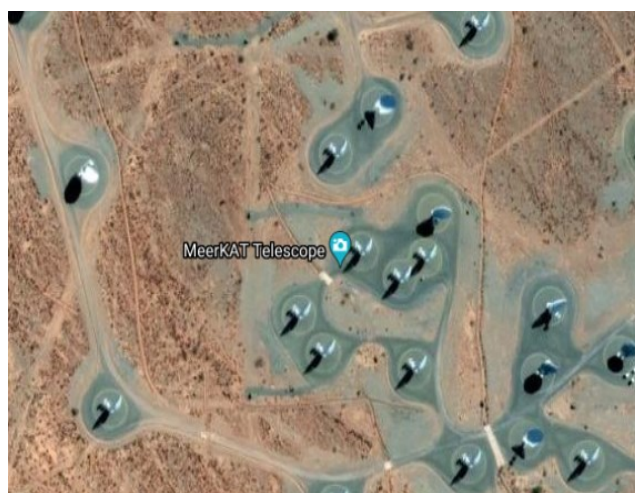
https://photos.google.com/share/AF1QipMPdk8LOQcZFxLGdXzjAAM1o3XSxvcfTpDMdAeaXdyUJNwUaBYyJgH_bhy-K7asJg?key=Tms1SXUyWmJ5cmdfQ1RoaGgxYXNtd05SZmhiQVZR

~ Thomas VE7TOA



With MeerKAT at its inauguration, 2018

SURREY AMATEUR RADIO COMMUNICATIONS



SURREY AMATEUR RADIO COMMUNICATIONS



The OTC Report

John Brodie VA7XB

Progress continues despite COVID!

Damn the torpedoes, progress at the Operations & Training Centre (OTC) continues despite COVID! For this we can mainly thank the Saturday morning volunteers who show up between 10 and 12 after breakfast at Denny's. As demonstrated during the recent RAC Winter and CQ WW DX contests, improved reliability of equipment operation has resulted from the installation of a new Windows 11 computer and its integration with the IC-7610 transceiver and N1MM logger. Now the same needs to be done for the Flex 6600 so it is at a state of operating readiness equivalent to the 7610.

In support of our objective of having all equipment powered from the UPS and 12v so we are not reliant on mains power, cabling of the new computers has been changed accordingly. Room lighting has been similarly improved by the installation of a 12v LED strip on the ceiling. Security cameras now monitor the interior of the radio room and an exterior camera will be relocated to focus on the tower. RF sniffing within the OTC building reveals that light fixtures, power supplies and POE devices are creating RF noise on our radios and need servicing and/or replacement.

Plans are afoot to relocate the multi-band wire antenna to a new location further removed from the tower with its orientation such that primary radiation lobes are more in an E-W direction. It is anticipated that its new orientation will also reduce mutual interference between radios. This is a winter job to be done when leaves are off the trees, as a line must be shot over a tall conifer immediately north of the OTC, clear of the heavy deciduous growth.

The SARC crew performs an apparently long ignored roof maintenance



SURREY AMATEUR RADIO COMMUNICATIONS

Two ladders have been purchased, for ready availability and to preclude the necessity of a member bringing ladders back and forth from home. One of these, a 12' stepladder, will facilitate access to the antennas on the (lowered) gray tower when servicing is required. The second, a 24' extension ladder, is for the purpose of accessing the rooftop for cleaning and feedline maintenance. Both ladders are now supported by hooks fastened to the interior wall of the container. At the same time, further cleanout and organization of stored items was undertaken to tidy up and dispose of unneeded items (see photo).

A few members attended the Richmond ARC's swap meet and sold a few surplus items which raised \$100 and further reduced the clutter in our storage container. We have now removed the large generator from the gray tower and purchased a heavy duty wagon to facilitate its easy transport to outside the radio room, for deployment during an emergency; installation of suitable cabling and connectors for the generators is one of our next tasks.

During recent weeks of heavy rain, water had penetrated the roof and leaked onto the floor of the OTC. Recognizing the need for maintenance, several members as a Saturday morning project blew debris off the roof and cleaned the drains to preclude water buildup. It was decided that this is a task which needs to be done at least annually in the fall.

Saturday mornings will continue to be used for various work projects for those who feel comfortable attending, consistent with COVID protocols.

~ John VA7XB

From above: More roof maintenance, the cleaned-up container and the radio room in its current configuration.



As a result of recent COVID restrictions, we are unable to run the **CW course** in January as planned, so it has been postponed to the middle of February. You will be advised of the new start date for the course when we are able to see sufficiently far ahead to plan for it.

Apologies, but this is, of course, beyond our control.

~ John Brodie

SURREY AMATEUR RADIO COMMUNICATIONS



John Brodie VA7XB



The CQ WW DX contest (CW) on the last weekend of November was one of our most successful contests ever, with 1643 Qs for a claimed score of 916080. The four members who participated were Stan VA7NF, Jan VA7VJ, Kevin VE7ZD and John VA7XB.

in our contact log, with all bands from 10m to 80m finding action. It was especially gratifying to find 10 and 15m open, after the long winter of low sunspots and poor propagation over the recent years. Middle Eastern and African contacts were conspicuously few this time around but compensated by the last hour of the contest on Sunday, when greyline conditions prevailed and brought in Malaysia, Indonesia, and Vietnam at S9+ levels to wind things up with a bang.

A post contest analysis by Stan suggests we need to do more to reduce ambient RF noise and to improve our multi-band wire antenna. His attention was diverted during the night by water leaking from the ceiling into the adjacent area of the building, which needed corrective action to catch the drips. However, our station comprised of the IC-7610, Expert Linear 1.5, N1MM+ logger installed on a brand new Win 11 computer served us well, with no problems.

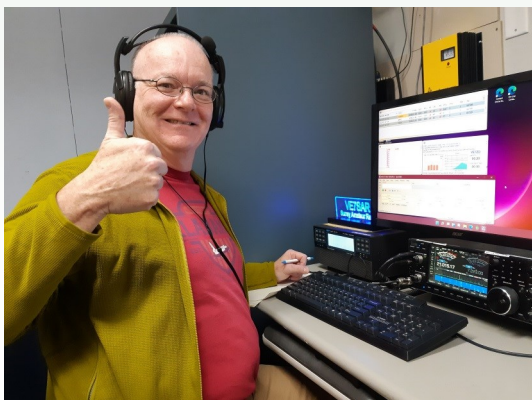
Here are the statistics:

Operator	3.5	7	14	21	28	Tot
VA7NF	153	150	10	0	0	313
VA7VJ	0	53	436	301	0	790
VA7XB	14	44	232	119	15	424
VE7ZD	0	0	1	90	25	116
Total	167	247	679	510	40	1643

Especially noteworthy was Jan's performance with 790 Qs over 2 shifts. Note also Kevin's excellent debut, quickly stepping into RUN mode after one short turn around the track on S&P for his first CW contest in 20 years. And Stan was left to contend with 40 and 80m where he made 313 Qs, which is pretty amazing under night time conditions with high noise levels.

All continents except Antarctica were represented

Top John Brodie VA7XB and below Kevin McQuiggin VE7ZD



SURREY AMATEUR RADIO COMMUNICATIONS

M/S HP		Score	QSO	Mult	Countries	Zones	Last		Log
1	K1LZ	14,733,508	6,262	809	631	178	19:31	Yankee Clipper Contest Club	DX
2	ZF1A	13,440,974	7,848	701	533	168	19:27	#goodluckboys #n6mjsucks #kl9asucks	DX
3	W2FU	10,464,448	4,936	736	568	168	19:29	North Coast Contesters	N+
4	K5TR	7,507,601	4,053	709	529	180	19:33	Central Texas DX and Contest Club	TL
5	N1MM	5,473,728	3,372	559	431	128	19:29	Yankee Clipper Contest Club	N+
6	K3AJ	5,373,541	3,129	601	461	140	19:29	Potomac Valley Radio Club	N+
7	AD4ES	4,989,376	3,043	592	451	141	22:28	Florida Contest Group	N+
8	K1KP	3,401,683	2,347	499	384	115	19:28	Yankee Clipper Contest Club	N+
9	W7VJ	2,372,150	1,933	454	318	136	19:28	Bavarian Contest Club	N+
10	VE7SAR	916,080	1,643	240	152	88	20:01	Surrey Amateur Radio Communications	N+
11	NW6P	129,940	263	178	107	71	19:28	West Valley Amateur Radio Association	N+
12	W4THI	111,066	233	173	126	47	19:33	Florida Contest Group	N+
13	NO5W	4,802	35	49	34	15		Jefferson ARC	N+

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Downloaded by K1LZ

Amateur Radio as a Vehicle for Technology Literacy

Chris Burger ZS6EZ and Hans van de Groenendaal ZS6AKV have produced a paper 'Amateur Radio as a Vehicle for Technology Literacy' which looks at the situation in Africa

Africa faces a shortage of technologically-proficient people who can develop and maintain our ICT infrastructure and drive innovation to facilitate manufacturing and services. Amateur Radio offers a vehicle for technology training that has reaped great rewards for many countries. The barriers to entry are continuously dropping.

The article explains the potential of Amateur Radio for technology development, looks at the current state of Amateur Radio in Africa and suggests avenues that might be explored to allow wider access on the continent.

Download the PDF of the paper from

<https://ur.booksc.eu/dl/68281938/e2535a>

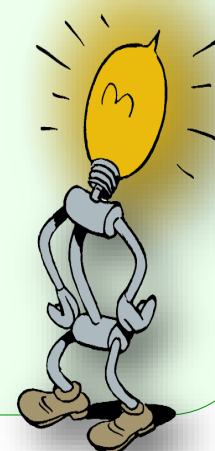
~ via Southgate Amateur Radio News

Digital Radio Operating Manual

Those interested in digital radio can download a copy of the Digital Radio Operating Manual from the Galway Radio Club web page. This manual is packed with information about the various digital modes, information about repeaters and gateways, maps and lists of EI, GI and UK talk Groups.

<https://www.galwayradio.com/>

~ IRTS



SURREY AMATEUR RADIO COMMUNICATIONS

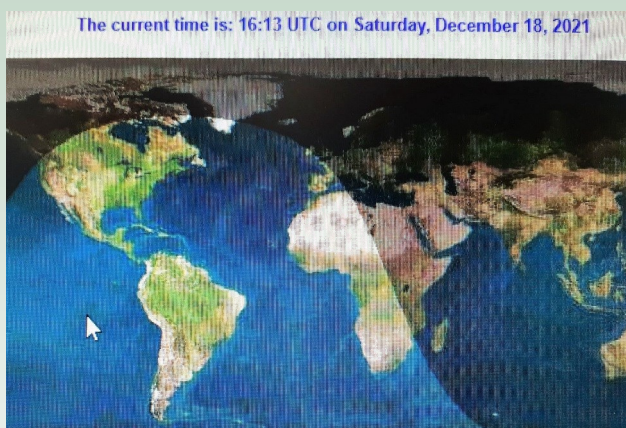


John Brodie VA7XB



Another great RAC winter contest under our belts with help from the contest crew!

Things started out slowly on Friday night as 20m faded out early and 40m was not producing much action on SSB. Then N1MM crashed and took some time to bring back on line.

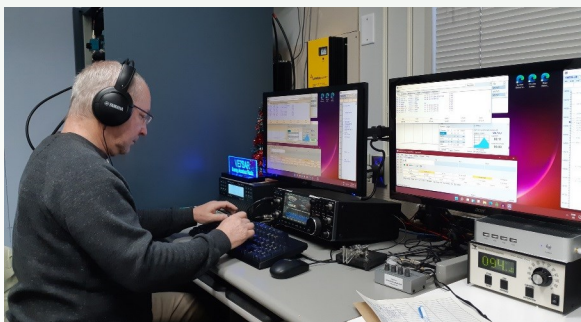


Working the 'Grey Line', the line that divides day and night, enhances propagation... and it paid off.

Saturday was a different story as both SSB and CW were active and producing pileups all day long. Even Europeans were represented including F5IDT, F5OHM, M10BHX, DL2LDE and IK2YCW with strong signals during the grey line period around 8 am (and the beam pointing east!). By late afternoon towards the close of the contest, things quietened down again with average 5 min between each CW contact.

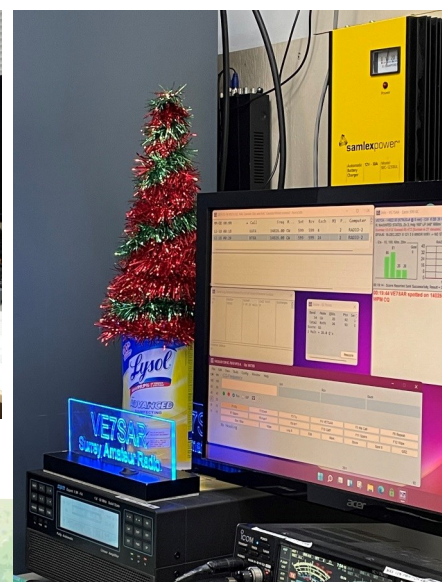
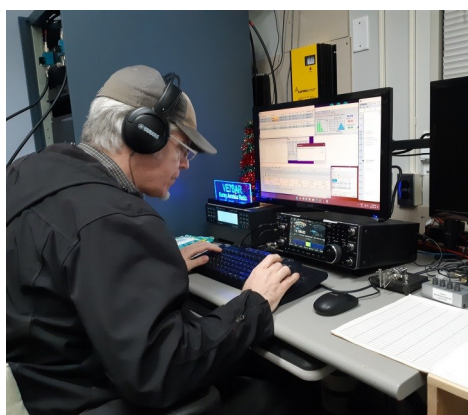
The RAC Winter Contest is only a 24 hour event, so with 8 operators planning to participate, the shifts had to be kept short. Missing from the operators list are Thomas VE7TXL and Les VA7OM, whose shifts had to be cancelled for various reasons. A credible showing by all.

These are the results for reporting stations as shown by Contest On-Line Scoreboard for the multi/single category.



SURREY AMATEUR RADIO COMMUNICATIONS

M/S HP		Score	QSO	Provinces
1	K3AJ	533,028	870	86
2	N3QE	361,438	732	77
3	K9OM	279,598	674	71
4	W3LL	274,984	359	74
5	KB0V	237,020	391	70
6	N4SS	189,504	557	63
7	KV0I	171,000	528	50
8	VE7SAR	149,840	833	40
9	PY5AMF	104,900	399	50
10	W1AJT	93,744	206	42
11	NN2NN	87,010	138	55
12	NM5M	83,226	300	39



SURREY AMATEUR RADIO COMMUNICATIONS



SARC member Mike Zavarukhin reports that he came back from Russia on November 22. He will try the RAC Winter contest from his new location on Mt. Thom in Chilliwack, BC formerly VE7SV's place.

73, Mike VE7ACN - RW0CN - VA7XW - AA7CH

Thank you for the
feedback Peter



Hamshack. ca

- Receives 12,000 or so visits per week
- Has over 500 registered users
- Usually sits at about 250 active listings as items seem to move very quickly

Most importantly, I have continued with the amateur radio club listing initiative and recently added a self-enrolment form for clubs to add their own listings on the site. In addition, living through a pandemic made me realize the importance of emergency planning, and the importance that amateur radio plays in the emergency management field, by providing emergency communications services to public agencies and other organizations. Group representatives adding their organization to the site now have the ability to list the emergency communications services provided by their group.

It is anticipated that this emergency communications inventory will be accessed by public and other organizations to augment existing communications capacity for inclusion in emergency management planning.

~ Don Rosberg, VE7DXE
250.380.8401



General Meeting Minutes



November 10, 2021
SARC General Meeting

Attendees: 41

Start Time: 7:00pm

Location: Online Zoom Meeting

Welcome and Call to Order - (Steve VE7SXM)

Review and Approval of Agenda - (Steve VE7SXM)

Announcements (ALL)

• Richmond ARC Swap meet, Nov 27th

We have purchased a table at this swap meet and are looking for members' support and help, or bring your own things to sell.

• Dec 4th, 2021 - Social at the OTC (Saturday morning)

The Christmas party has been officially cancelled and the deposit has been carried over for another year with the restaurant.

In lieu of the party, it was proposed that we have a social event at the OTC on Saturday AM Dec. 4th.

Survey of those at the meeting indicated that 83% of respondents were in favour of finger food and snacks.

The Board will discuss and prepare an announcement.

Health orders at the time will be reviewed prior to the meeting and we will be following them based on an organized gathering.

• Jan 12, 2022 - General Meeting Presentation (Steve)

Dave Jewers VA7DBJ - Parks on the Air

• Silent Key - Bob Buckland VE7FWZ (John VA7XB)

Bob was our longest term member, and very active in the club up until a few years ago. He was on the Board of Directors for many years. His family recently donated all his ham gear to the club which was offered for sale to members at the parking lot sale in Sept. A minute of silence was observed. Scott will send a card to the family.

• Financial Report - (Scott VA7HA)

Scott provided a brief report of expenses and deposits.

Committee/Other Reports (All)

• SEPAR - (Gord - VA7GK)

A motion has been proposed regarding SEPARS (Society) dissolution process and merging the assets. The Executive is working to complete this in the month of November.

SEPAR is encouraging members to get set up on digital modes including Winlink and APRS.

• OTC - (Gord - VA7GK)

Net have been run on Tuesday nights from the OTC, which has great coverage.

SURREY AMATEUR RADIO COMMUNICATIONS

Ongoing work to the radio room includes a cabinet for batteries between the desks and remote control head for the VHF radio.

The lease is in discussion amongst SFC/SARC/SFSAR

- **New PCs (John S)**

Purchased 2 mini PCs for the OTC radio room ~\$1400 CAD. Core i5 fanless processors, with ports as follows: 4 USB 3.0, 4 USB 2.0, 1 VGA, 1 HDMI. Both have been setup ahead of time and have been stressed to confirm heat dissipation. M2 solid state HD. Very fast at booting up. 16gb RAM. One is Windows 10 Pro and the other is set up with Windows 11. All our amateur radio software has been installed and testing is on-going.

- **Reg (VA7ZEB)**

Currently testing APRS gateway at the OTC, receive only.

The iGate has performed extremely well at the location with the superior external antenna. It received hundreds of APRS packets from all over the lower mainland and also Vancouver Island. More packets in an hour were received at the OTC than in months at Reg's home apartment.

A bidirectional gateway is being looked at now. Surplus Tait radios may be used to improve signal.

Erica has received a callsign of VA7ISL.

Gord mounted an HT radio running APRS broadcasting beacons and had limited success reaching the map (via iGates). Mission to Golden Ears bridge finally received a packet on the Internet. When the iGate was set up at OTC it plotted all around the area.

- **Membership - (John - VA7XB)**

Over 100 members are in good standing plus a further 200+ of prospective members from the ham class.

We always lose a few members each year but they often return over the following months.

- **Contests - (John - VA7XB)**

- Oct 29-30 CQ WW SSB DX Contest ~13 members participated and approx half had never contested prior. 674 contacts and 2 contacts from the Middle East.

- Nov 13 2m QSO Party

Nov 27-28 (weekend) CQ WW DX (CW) - Schedule is being filled in now. Contact John at va7xb@rac.ca to participate in any contests.

- Nov 13-14 Worked All Europe DX Contest We need at least 3 experienced participants to make this possible.

- **Nets - (John - VA7XB)**

Looking for additional net controllers 1 night a month.

Reg volunteered for the 5th week in Nov and other 5th week coverage.

- **Communicator - (John - VE7TI)**

Reaching 140 countries now.

Lots of great feedback on the recent edition and several groups are helping with redistribution.

Send your links, stories and articles to John ve7ti@rac.ca

SURREY AMATEUR RADIO COMMUNICATIONS

• Ham Class - (John - VE7TI)

We have finished the latest course. Some students will write the exam Saturday. Others have chosen to study for a week, and a few are from out of town and will be seeking examiners in the community.

• Repeater Update/Status - (Steve - VE7SXM)

No new intermod issues reported.

Reg reported that the repeater identifier announcement is interfering with some conversations.

John B recommends we truncate the length of the message to not include the IRLP node number etc... We would ask Dave Cameron to adjust this.

New Business - (Steve VE7SXM/ALL)

• New Projects List (Steve)

Discussion will take place regarding new projects and the funding that will be required.

The board is working on this list and will share with membership along the way.

The purpose of this process is to engage the membership early in the project process and to provide transparency in project spending.

• OTC Committee (Gord VA7GK)

We would like to create a new OTC committee to provide guidance in OTC management and maintenance.

Input from the committee will be used by the board to make decisions regarding the OTC.

Contact Gord to participate on this committee.

• Repeater Manager/Committee (Steve)

We are looking to the club membership for volunteers on ALL committees. Please let us know if you are interested

Other New Business

John B. Some work is needed on the OTC antenna tower. It becomes difficult to perform this during bad weather so it should be done soon. Proposed date is Nov 20th Sat 10am (weather permitting). We need about 4-6 volunteers.

Scott H: Jim McNee VE7GD in White Rock has some historic SARC paperwork. Field Day logbooks (Blackie Spit) and Centennial contest certificates. Circa 1979-1990.

Next General Meeting January 12, 2022

Will be a ZOOM meeting, invitations will go out shortly before the meeting - Presenter is Dave Jewers for Parks on the Air

Adjourn - Steve

Scott H. moved to adjourn the meeting.
Seconded by John B. Carried

Meeting adjourned at 8:03pm

Minutes prepared by Jeremy Morse VE7TMY

Presentation followed - Doug Patengale VE7CQT on Digital Modes

SURREY AMATEUR RADIO COMMUNICATIONS



Doug Pattengale
VE7CQT

The November meeting presentation was given by Doug Pattengale VE7CQT. Doug spoke about DMR at a previous SARC meeting but this presentation expanded on that and provided a thorough insight into DMR features and advantages.

Digital Mobile Radio (DMR) can be intimidating to understand, and there is a steep learning curve to get operational. Amateur Radio DMR has been derived from a commercial digital system, developed as a standard in Europe. It has many capabilities that are beyond the needs of most amateurs.

There are a few essentials you need to understand about DMR and the networks in BC.

Radio Identification

Each radio must have a unique identification used like a computer address. The DMR ID is obtained by registering at Radioid.net. Once you have the ID it needs to be programmed into the radio. This is usually done using a tool called Customer Programming Software (CPS). The CPS is also used to program all the other settings necessary for communication.

The registered information is published and can be loaded into the radio as a Radio ID List which behaves like a cellphone address book. This allows the callsign, name and location to be automatically displayed during communication.

Talk-Groups

Normally you will want to talk to people using a talk-group. These are numeric codes used to route the data just like computer network addresses. Talk-groups allow many radios in the same group to receive the same broadcast messages. These may be used to direct discussion to a specific region, like BC, or a global topic, like the Gathering Group. Repeaters do not necessarily support all talk-groups and it may be necessary to see if the desired talk-group is available on the repeater.

Radios can also be addressed individually with a similar numerical Radio ID code. It is important to set the code as a Group Call rather than a Private Call.

Radios can send voice digitally on a talk-group but only those radios set to listen to the specified talk group will hear the communication. Some radios also support a permissive monitor mode which allows them to hear everything being transmitted on the frequency in addition to the selected talk-group. If you have enabled monitor then you may hear stations but find that you cannot talk to them. This is because they are listening to one talk-group while you are sending to a different talk-group.

Time-Slots

Radios and repeaters support two time-slots which allow two simultaneous conversations to occur within a 12.5 kHz band on the same frequency. This means you need to select the correct timeslot for the required talk groups. Often the talk groups are only supported on one of the two time-slots.

SURREY AMATEUR RADIO COMMUNICATIONS

For example, BC-1 is typically found on time-slot 1 while BC-2 is found on time-slot 2.

Colour Codes

Radios also require a colour code setting. These are like having subaudible tones open the squelch, but are numeric codes sent digitally. Usually, repeaters will use colour code 1 with a few exceptions. For example, the Whistler and Squamish repeaters are both on the same frequency and use colour codes 2 and 3 respectively to distinguish between them.

Channel

A communication channel is a combination of frequency, talk-group, time-slot and colour code. It is important to have all of these configured correctly to communicate. Amateur Radio DMR will normally have very many channels to connect through different repeaters and many talk-groups on each repeater.

Zones

Zones are collections of channels that are normally associated with one another. Typically, people program many channels on the same repeater with multiple talk-groups. However, we could just as easily program a zone to be many channels with the same talk group on multiple repeaters.

Code Plugs

The complete set of programming parameters consisting of Radio ID, Channels, Zone structure and Radio ID list form a software package called the Code Plug. This is the thing that is downloaded to the radio when programming it.

Radio Networks

There are several ways to communicate with other radios. The most basic, but seldom used, is peer-to-peer which is like two radios talking directly to each other working simplex. Radios can also communicate via a repeater just like analogue radios. One of the benefits of DMR is that most repeaters are interconnected over the Internet to form a network. When you transmit on BC-1 your messages will be broadcast across most of the repeaters in BC.

There are several networks that are interconnected. This is like having several local area networks (LANs) interconnected by the Internet. The two most popular DMR networks in BC are BC-TRBO and Brandmeister. They often use different talk-group addresses. For example, repeaters on the BC-TRBO network have an address for BC-1 of 3027 while repeaters on the Brandmeister network have an address of 30271. It is therefore necessary to know which network you are connected to know the correct talk-group address.

My Experience

I was due for a radio refresh, so based partially on Doug's excellent presentation, I recently purchased a mobile transceiver capable of DMR. It is a tri-band radio with 2m, 1.2m and 70cm capability.

The included documentation was not very useful however, the distributor in the US has an excellent website at bridgecom.com which provides links to plenty of files and videos to get started. Couple that with another excellent resource at BCDMR.wordpress.com and you're off to a good start.

I must mention the excellent support I received from Doug personally. He answered my questions about which radio to buy and provided me with set-up guidance to load my local codeplug, which is the key to programming a DMR transceiver. Thanks Doug!

~ John VE7TI with content from BC DMR

View Doug's presentation slides [here](#).



SURREY AMATEUR RADIO COMMUNICATIONS

Reprint Policies

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We welcome your comments and feedback

Please consider leaving a comment via email to communicator@ve7sar.net, or on our blog site <https://ve7sar.blogspot.ca> or, better yet, contact our authors directly, so they know someone is out there reading our publication.

Thinking of our members...

This is the time of year when we give thought not only to the meaning of Christmas, our extended family and charitable giving, but also to those around us who have been affected by illness or other unhappy circumstances. In this spirit, deserving of special mention are members Barry Conroy and Rick Law, both of whom are recovering from serious health issues experienced over the past year or more. It would be inappropriate to provide details in the Communicator, but if you wish to reach out to Barry and Rick, they would probably like to hear some encouraging words and your wishes for a continuing recovery and better times. You can reach Barry at ve7byf@gmail.com and Rick [top right] at ricklaw@telus.net.



Also, older members will remember former President, Walt Bond, who moved to Alberta with his wife Lilas about 10 years ago. Walt is also in poor health and might appreciate hearing from his old friends. Walt can be reached at bondlilas@gmail.com.



Robert Fishwick VA7FMR [center] took a slip in the snow and broke a bone in his leg while leaving to attend the Saturday morning coffee. He is on the mend and we wish him well in his recovery.

And finally, we learned that Bob Buckland VE7FWZ [bottom] is now a silent key. We owe thanks to Bob's wife Eileen VE7IRK, who was generous in donating Bob's station equipment to SARC where it has been put to good use helping new hams get started, and raising funds for club use.



SURREY AMATEUR RADIO COMMUNICATIONS



SARC Meeting Minutes

December 4, 2021

In lieu of a formal December meeting we typically adjourn for a Christmas lunch. Given we have not been able to do this since COVID, we opted to have an informal gathering at the OTC. All Provincial guidelines were adhered to.

About 20 members, including a few we haven't seen for a while, showed up for SARC's informal Christmas open house on Saturday December 4th. Donuts and coffee were provided, supplemented these with cakes, cookies and other home baked goodies brought by the attendees. Yes, there was lots of shop talk but non-technical discourse was more typical, in keeping with the holiday spirit.

Since we had recently experienced heavy rains and a roof leak, a few of us took the opportunity during the social get-together to put up a ladder and clear leaves from the roof drains, allowing the accumulated water to run off. It was decided that at the first Saturday opportunity a work party will take on the task of blowing leaves, branches and other debris off the roof and clear all the drains.



SURREY AMATEUR RADIO COMMUNICATIONS



POTA presentation

The presentation at the **January 12th** SARC monthly meeting will be on Parks On The Air (POTA). The presenter, Dave Jewers VA7DBJ will discuss his experiences and ways in which you too can participate. Some of the basics...

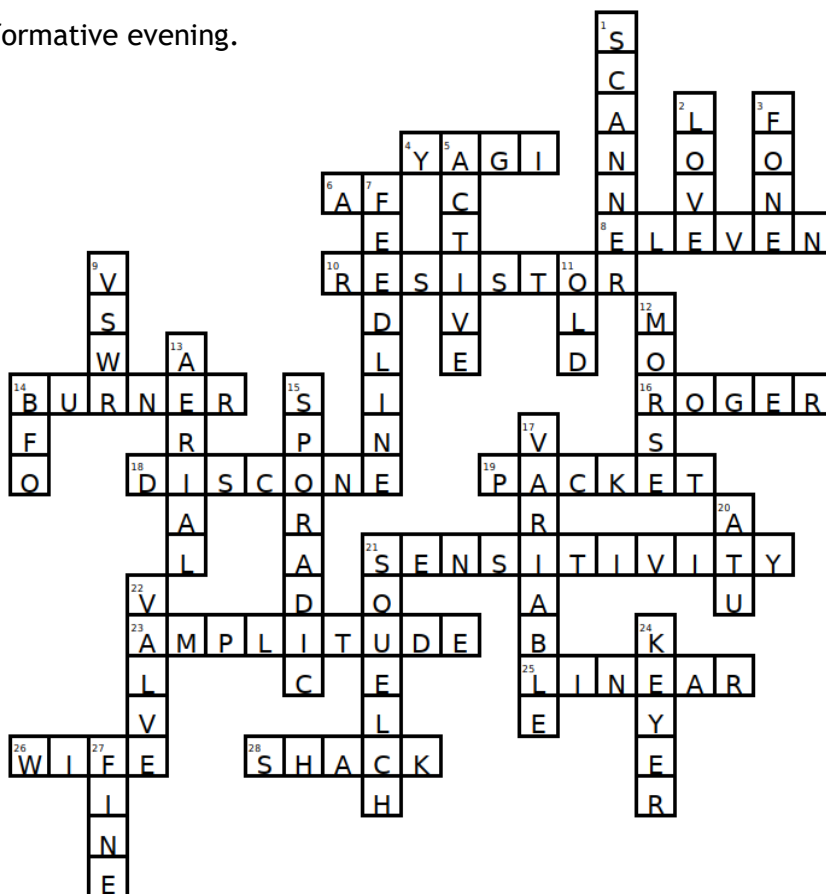
The activator and all the equipment you use must be within the perimeters of the park, and on public property. Activators cannot attempt to activate from any private property as the spirit of the POTA program is to get out of the house and operate, but you can do it from a vehicle/park bench/various methods etc.

The park must be OPEN/have permission from the administration to be there. Use the map on the POTA site in combination with Google Maps, and official park sites to find the official boundaries. If the park is part of a trail system or river, you need to be within 100 feet of the trail or river. You may never trespass on private property to access state/provincial or federal lands without permission.

It should be an informative evening.

The Crossword Puzzle solution

From page 77



SURREY AMATEUR RADIO COMMUNICATIONS

MeerKAT presentation

The presentation at the **February 9th** SARC meeting is “A technical overview of the MeerKAT radio telescope”, by the MeerKAT Program Manager, Thomas Abbott, ZS1TE / VE7TOA.

MeerKAT is a \$250 million South African project. It consists of an array of 64 13.5 metre dishes, installed in the Northern Cape province, about 800 km north of Cape Town. Each dish is fitted with cryogenic receivers for UHF, L and S bands, covering 590-3500 MHz. An FPGA-based correlator, science processor are installed in a shielded underground data facility behind a hill. The 30 Petabyte data archive is housed in Cape Town. Construction of MeerKAT started in 2012, first light was in 2014 and official inauguration was in 2018.

In this talk Thomas will introduce the whole MeerKAT system to give an overview of its components and capabilities, and then dive into some technical detail about its receivers and their sensitivity, and its pulsar timing system. He'll also share some of the beautiful pictures made by the scientists working on it.

See Thomas' 'Radio-Active' profile on page 97.

~



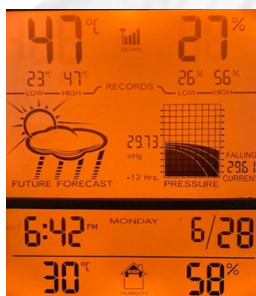
SURREY EMERGENCY PROGRAM AMATEUR RADIO



SEPAR Report

Gord Kirk VA7GK
SEPAR Coordinator

2021: A variable weather year



Alert for Alert Southern BC (00aJI)

Issued at 2021-11-07 00:30 UTC by Environment Canada:

Tornado watch issued for:

Howe Sound, B.C. (082500)
Metro Vancouver - North Shore
including West Vancouver and North Vancouver, B.C. (082610)

Current details:

Conditions are favourable for the development of funnel clouds and possibly brief, weak tornadoes.

A waterspout was spotted west of Vancouver International Airport and is

It has been a very busy couple of months since our last report. Over this last summer we experienced a heat dome with higher than ever recorded temperatures in Surrey. In fact, on my own patio in the shade the temperature measured 47C on the hottest day. (I took a picture because I think many would not believe me). If anyone participated in Field Day 2021 this was during the local heat dome here in our area.

This triggered forest fires, evacuation and included the entire town of Lytton being destroyed by fires. Now the fires were far away from Surrey (at least a couple of hundred Km), however they caused main highways to be shut down impacting transportation routes. They also put communications at risk with many of the national communications fibre cables passed through fire areas. Of course, if you were in an area impacted by fire, power outages also led to impacts on the cell towers again putting local communications at risk.

The summer ended and the fires were eventually contained, however the risks of debris and mudslides onto highways were now also at risk when the normal fall rains began.

The fall weather again was some of the most extreme we have ever seen. In the Greater Vancouver (southwest BC) area we are all familiar with the term Pineapple Express. This means heavy continuous rains for several days at a time. Well to many of us we had another surprise weather event occur. A small tornado was confirmed to have hit Vancouver near UBC. Some building and tree damage occurred, and it took Environment Canada a day or so to confirm it was actually a tornado not just a waterspout.

This tornado also caused a very local power outage from trees falling across power lines etc.

Next in our fall was a disaster that may be the largest in Canadian History. The pineapple express was now being called "atmospheric rivers" we were hit by three in a row, the

Weather Can App Alert

SURREY EMERGENCY PROGRAM AMATEUR RADIO

first causing billions of dollars of damage due to flooding and landslides. All the highways leading to and from Greater Vancouver, Fraser Valley were impacted. Several people died when the road they were stopped on by a landslide when a second one came down and swept them away. On other highways people were trapped with the roads being washed out both in front of them and behind them. Small communities were overwhelmed with people stuck and no ability to get supplies in or out. Until the weather changed even flights to survey the damage were impossible. Flooding also occurred as rivers overflowed their banks and a dike broke causing evacuations and damage to widespread areas.



This flooding also caused the Trans-Mountain Pipeline to be shut down until inspections could be done to ensure it was not damaged. Fortunately, the pipeline was not damaged, however the areas it passed through had to be restored to allow it to be safely turned back on. This was further complicated by two more storms approaching and causing delays in this being safely restarted. This made for potential shortages of fuel and the government along with a Provincial State of Emergency Declaration

Name	Frequency	Offset	CTCSS
VE7RSC (Primary Repeater)	147.360	+0.600	110.9
VE7RSC (Secondary Repeater)	443.775	+5.0	110.9
VE7RPT (Primary Regional Repeater)	146.940	-0.600	
	Optional 136.5 Rcvr		
Simplex 1	(VHF) 146.550		
Simplex 2	(VHF) 147.420		
Simplex 3	(UHF) 446.550		
Simplex 4	(UHF) 447.425		

Other frequencies in the Greater Vancouver area:

Primary: Coquitlam/Abbotsford	146.430
Primary: Inter-Municipal Group 3	146.445
Primary: Vancouver; Mission; Sec. Coquitlam	146.460
Primary: Kent-Mission; Sec. Richmond	146.475
Primary: Inter-Municipal Group 2	146.490
Primary: New West; Sec. Richmond	146.505
National Calling / FM Simplex Group I	146.520
Primary: North Shore; Port Coquitlam	146.535
Primary: Bowen Island; Surrey	146.550
Intermunicipal Group 1 Coordination	146.565
Primary: Lions Bay/Vancouver/Delta/Langley	146.580
Primary: Port Moody; Sec. Burnaby	146.595
Secondary: Vancouver/Surrey	147.420
Secondary: Vancouver (UBC) / Maple Ridge	147.450
Primary: White Rock/Chilliwack; Sec. No. Shore	147.480
Secondary: Burnaby/Pitt Meadows	147.510
Primary: Delta; Sec. Abbotsford	147.540
Primary: Hope; Sec. Delta; ALSO EMBC	147.570



Surrey Emergency Program Amateur Radio



SURREY EMERGENCY PROGRAM AMATEUR RADIO

Look for our refreshed SEPAR program page at [Surrey Emergency Program Amateur Radio](#)

implemented a limit of thirty litres of fuel per visit to help make sure there was enough fuel for everyone.

While it has now been a few weeks and transportation routes are slowly being opened and the pipeline is now flowing fuel again we are still experiencing another weather event. This time it is snow and extreme cold. While rare we are better prepared for this weather. Of course, like the rest of the world we are still experiencing the day-to-day impacts of COVID individually and as a community.

So, the lessons for a SEPAR and anyone involved in emergency preparedness.

1. Expect the unexpected. Don't think it cannot happen here. Events in nearby areas can affect you as well.

2. When travelling be prepared to be stuck, longer than a couple of hours. Do you have a seasonal kit with you as a passenger or driver when you are out of your immediate area?

** This is a good example of when a 72-hour bag can be useful. Don't forget your prescriptions and over the counter medications you normally take.*

3. Sign up for Weather Alerts using an app on your phone. When you get an alert, read it and understand it. Is it a Statement, Alert or Warning? Learn the difference and think through the implications for you and your family. When you get these do you use them to remind yourself you could be needed as a volunteer? Do you monitor the local repeaters during this time etc.

4. Make sure you have a communication plan with your family. While the focus of SEPAR is

amateur radio make sure you have a plan with your family that is not licensed. Could you radio another amateur radio operator in your area and have them contact your family? Have you done the very basics of getting an out of area contact set up to phone? Do you have a family text group set up on your phone, etc.?

5. As an amateur radio operator make sure you know the basics of how to use your radio, program a repeater, and how to listen to the reverse (input) of the repeater.

6. Make a point of regular checks on things like generators, fuel supplies, and keeping both your car and radio batteries full.

We in Surrey have been truly fortunate to have been spared much of the direct impacts of the various events of the year. However, we can and should learn from them. SEPAR will be working hard in the new year on continuing to develop a strong Emergency Communications Program as part of the City of Surrey's Emergency Program. We have started a refresh of the program in 2021 and look forward to continuing to work with the great ideas and volunteers working to make our community a little more resilient and prepared for what may come our way in 2022.

We wish everyone a very Happy New Year.

If you are interested in the SEPAR program and wish to become more involved, please let us know. Our website is www.separ.ca and there is a form to contact us.

~ Gord Kirk VA7GK
SEPAR Coordinator

Our weekly nets are every Tuesday night on the SARC repeater on 147.360 + T110.9 at 07:30 pm PST. All are welcome to check in.

We're QRT

2022... Bring it on!

Steve McLean VE7SXM

As I write this, Christmas is fast upon us, however, by the time you read this, Christmas and New year's will be a fading memory, as we move on to a new year in 2022. The RAC Canada contest, although only 24 hours, was a short and busy contest, with a single station and multiple operators, the SARC team was able to make contacts across North and South America, as well as many countries in Europe, with over 800 HF contacts in both CW and SSB.

This past year has been very challenging for many, struggling to understand and adhere to all the restrictions and health concerns. With that said, we've been able to accomplish a lot this year, with getting the OTC back in operation with two excellent HF stations as well as a VHF/UHF station. We have been provided with a very nice space for the OTC, although the radio room is small, we have access to the entire building, including space for classroom, casual meeting space and a kitchen area. We had a great turnout at the OTC for the Dec 4th casual get together in place of this year's Christmas party, I'm looking forward to a time when we can have more of these types of gatherings, once again.

We have many projects on the list for 2022, and with hope we will be able to get beyond the current Covid situation, and maybe get back to some sort of normal, were we can accelerate these projects with involvement from more of our membership.

I also want to call out and thank our training team of John Schouten, John Brodie, Stan Williams and Kevin McQuiggin for all their time and effort in producing and delivering the many training classes this past year, which it turning out a number of high quality Amateurs and creating significant income for the club.

I look forward to a fantastic 2022.

~ Steve VE7SXM



SARC SOCIETY DIRECTORS 2020-2021

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[president at ve7sar.net](mailto:steve@ve7sar.net)

VICE PRESIDENT

John Brodie VA7XB
vice [president at ve7sar.net](mailto:john@ve7sar.net)

SECRETARY / WEBMASTER

Jeremy Morse VE7TMY
[secretary at ve7sar.net](mailto:jmorse@ve7sar.net)

TREASURER

Scott Hawrelak VE7HA
[treasurer at ve7sar.net](mailto:scott@ve7sar.net)

DIRECTORS

Gord Kirk VE7GK
(SEPAR Liaison)

Kevin McQuiggin VE7ZD / KN7Q

John Schouten VE7TI
(SARC Publications/Blog/Social
Media & Courses)
[communicator at ve7sar.net](mailto:john@ve7sar.net)
[course at ve7sar.net](mailto:john@ve7sar.net)

Stan Williams VA7NF

SARC MEMBERSHIP, NET & CONTEST MANAGER

John Brodie VA7XB
[membership at ve7sar.net](mailto:john@ve7sar.net)

SARC QSL MANAGER

(pro tem) John Brodie VA7XB

SARC REPEATER MANAGER

VACANT
[repeater at ve7sar.net](mailto:repeater@ve7sar.net)

A look back...

From The Communicator—February 2012



*Gone but not forgotten.
Brett VE7GM (SK) works the NAQP SSB contest. Brett was a SARC
Director, and was very active in training new hams.*

January-February

BRRR!... ITS REALLY WINTER!



For January we have a presenter who will speak about Parks On The Air (POTA). This is a relatively new facet of the hobby that is growing in popularity.

In February we will receive a presentation by SARC member Thomas Abbott VE7TOA. Thomas is a recent arrival in Canada from South Africa, where he was part of a team that built and implemented their Meerkat radio telescope array.

Both promise to be interesting Zoom sessions. We hope to see you there.

SARC hosts an Amateur Radio net each Tuesday evening at 8 PM. Please tune in to the VE7RSC repeater at 147.360 MHz (+600 KHz) Tone=110.9, also accessible on IRLP node 1736 and Echolink node 496228.

On UHF we operate a repeater on 443.775MHz (+5Mhz) Tone=110.9 or IRLP Node 1737.

We are looking for a SARC Net Manager. Its not a difficult job and, if you have some time to spare, we'd like to hear from you. Basically it involves scheduling someone to do the Tuesday evening weekly net.

	SARC Net 20:00 Hrs
1 st Tuesday Standby	Jean-Luc VA7JLU Reg VA7ZEB
2 nd Tuesday Standby	Jinty VA7JMR Sheldon VA7XNL
3 rd Tuesday Standby	Rob VE7CZV REG VA7ZEB
4 th Tuesday Standby	Kapila VE7KGK John VA7XB
5 th Tuesday Standby	Reg VA7ZEB John VE7TI
Want a turn at Net Control? Contact the SARC Net Manager	

Down The Log...

SARC Monthly Meetings

2nd Wed. (Sept-Jun)
1900 hrs at the [Surrey Fire Service Training Centre](#),
14923 - 64 Avenue,
Surrey, BC. Here is a
what3words link and map:
[https://what3words.com/
markers.addiction.ozone](https://what3words.com/markers.addiction.ozone)

Weekly SARC Social

COVID permitting,
Saturday between 0730
and 0930 hrs at the
Denny's Restaurant, 6850
King George Blvd., Surrey
BC

Workshops

Saturday between 1000
and Noon at the OTC
5756 142 Street, Surrey
BC

SEPAR Net

Tuesday at 1930 hrs local
on 147.360 MHz (+)
Tone=110.9

SARC Net

Tuesday at 2000 hrs local
on 147.360 MHz (+)
Tone=110.9

VE7RSC Repeaters

2m North: 147.360MHz+
Tone=110.9Hz
IRLP node 1736
Echolink node 496228
2m South: 147.360MHz+
Tone=103.5Hz Fusion
capable; No IRLP/EchoLink
1.2m: 223.960 Mhz -1.6
Tone=110.9 Hz
70cm: 443.775MHz+
Tone= 110.9Hz
IRLP node 1737



We Have A SARC Patch!

These are suitable for sewing on a jacket, cap or your jammies, so you can proudly display your support for SARC.

The price is \$4 each or three for \$10 and they can be picked up at a meeting or the weekly Koffee Klatch.

We thank our sponsors for their support of SARC

Please support them.



Successful Guide to the
Basic Exam
for the
Canadian Amateur Radio
Operator Certificate

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www.ve3yt.com for the guide, my intro book and cw course

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